# Appendix A

# PLN-652

# Packaging Glovebox System Assembly and Installation

Document ID:PLN-652
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Effective Date:7\19\2002

# PLAN

# Packaging Glovebox System Assembly and Installation for the OU 7-10 Glovebox Excavator Method Project

Prepared for:
U.S. Department of Energy
Idaho Operations Office
Idaho Falls, Idaho


Idaho National Engineering
and Environmental Laboratory

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| Plan<br><br>Environmental Restoration | **PACKAGING GLOVEBOX SYSTEM ASSEMBLY AND INSTALLATION** | Identifier: PLN-652<br>Revision: Draft<br>Page: 1 of 6 |
|---|---|---|
| Document Control Center:<br>(208) 526-0362 | Document Owner:<br>*Pit 9* | Effective Date: 7\19\2002 |
| | **USE TYPE 3** | Change Number: |

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# 1. SCOPE

Three Packaging Glovebox Systems (PGS) will be installed in the OU 7-10 Glovebox Excavator Method Processing Facility as part of the OU 7-10 Glovebox Excavator Method Project. This plan has been written to provide the Subcontractor the information required to assemble, install, and test each PGS.

*NOTE: This plan is in a draft state of completion. It cannot be finalized at this time. The subcontractor that is supplying the three PGS is required to prepare and submit a preliminary PGS assembly plan three weeks after award of the PGS fabrication Subcontract. When the preliminary PGS assembly plan is received (approximately mid August 2002), this plan will be revised and issued to the Subcontractor.*

1.1 Work Included

The Subcontractor shall be responsible for the following work. The list does not imply an order of operation. The Subcontractor shall decide on the order of operation for this work.

1. Receive the PGS subassemblies from the Contractor as GFE
2. Assemble each of the PGS
3. Move each PGS to the installation location in the Weather Enclosure Structure
4. Attach each PGS to the facility floor structure
5. Move each cart support structure into place inside the Retrieval Confinement Structure
6. Attach each PGS to the RCS
7. Perform the final testing.

1.2 Work Not Included

The fabrication of the PGS. The PGS will be provided as GFE..

# 2. PERFORMANCE

2.1 General

The PGS Subcontractor will fabricate, assemble, inspect, test, disassemble, and ship each of the PGS to the INEEL. Each PGS will be completely tested after assembly at the PGS Subcontractor's facility to verify dimensional, operational and sealing compliance. Only after each PGS successfully passes the tests and inspections, will it be disassembled. packaged, and shipped. The following is a list of the testing that will be performed at the PGS Subcontractor facility.

- Dimensional inspection
- Drive cart operational testing with load
- Auxiliary cart operational testing with load
- Fissile monitor load cell weight testing
- Safety beam operational testing
- Hoist operational testing
- Hoist load tests
- Helium leak testing
- Operation leak testing
- Electrical continuity testing

2.2 Delivery Schedule

The scheduled arrival dates for the each of the three PGS are January 6, 2003, January 27, 2003, and February 10, 2003. Upon arrival, the PGS shipment will be receipt inspected by BBWI to verify that there is no damage to any of the PGS components. After clearance through receipt inspection, the PGS components will be delivered to the Subcontractor as GFE for PGS assembly, installation, and testing.

2.3 Assembly and Installation

2.3.1 General

The PGS shall be assembled and installed as shown on drawing 522000 and per the assembly plan provided by the PGS Subcontractor. (*The PGS assembly plan will be attached when available – approximately the middle of August).* Additional drawings that BBWI used to fabricate and assemble each PGS at the PGS Subcontractor's facility prior to shipment to the INEEL are also attached to allow the Subcontractor a better understanding of the PGS details.

2.3.2 PGS / RCS Gasket

The Subcontractor shall provide the material to be used for the gasket between the PGS and the RCS. See drawing 522000. The Subcontractor shall use the actual installed dimensional clearance between the PGS and the RCS to determine the location of the hole to be cut in the gasket. The Contractor shall field cut the hole in the gasket.

2.4 PGS Subcontractor Representative

A representative of the PGS Subcontractor will be here at the INEEL for two weeks to provide consultation and advice during the assembly and installation of the first PGS. The Subcontractor shall provide 30 days notice prior to assembly and installation to allow the PGS Subcontractor to schedule the personnel.

2.5 Inspection and Testing

The following inspections and tests shall be performed on the installed PGS by the Subcontractor.

2.5.1 Operational Testing

The Subcontractor shall prepare for and perform the following operational tests. The sequence of testing shall be determined by the Subcontractor.

A. Drive Cart: The drive cart, loaded with a 350-lb weight, shall be moved between its travel limits by the electrically powered drive screw – using the operating pendant to demonstrate that the cart starts and stops as and where required. The override feature shall be demonstrated. This same test shall be used to verify cart, rail, and PGS capacity. The cart shall run freely and not bind on the rails.

Auxiliary Cart: The auxiliary cart shall be moved along the rails to verify rail alignment. A 200-lb weight shall be placed in the auxiliary cart and shall be moved through the cart movement range to verify cart and rail capacity. The cart shall run freely and not bind on the rails.

These test shall be performed initially at atmospheric pressure for operational verification and then at minus 0.7 iwg for operational verification at operating pressure.

B. Safety Beam: The safety beam (both sides require testing and verifying) shall be tested by placing an object into the beam to verify that after pushing the right or left cart button on the pendent, the cart will not start (the cart can be stopped anywhere in its range of travel). A second test shall be performed with the cart operating by placing an object into the beam to verify that the cart stops.

C. Hoist: The installed hoist and trolley system shall be fully and functionally tested in accordance with the manufacturer's procedures, manuals, and recommendations.

2.5.2 Helium Leak Test

The leak test shall be conducted after assembly of the glovebox. All openings in the enclosure such as feed-throughs, flanges, ports, or connections to the glovebox shall be sealed with plugs, caps, or cover plates as appropriate. The electrical connectors must be in place. (The glove rings are supplied with plugs installed). The Subcontractor is responsible for plugging and capping all openings. Note that the PGS Subcontractor will ship all the plugs, caps, or covers that was used for the leak testing at the PGS Subcontractor's facility.

The glovebox shall be pressurized to an internal pressure of 4 iwg (+0.0, -0.25) using a mixture of air with a minimum of 25% helium. The pressurization system shall incorporate the use of a pressure relief device to preclude subjecting the enclosures to pressures in excess of 4-in. of water.

Using a helium leak detection instrument capable of detecting leaks down to $1x10^{-5}$ $cm^3$/sec, sniff all welds and mechanical joints. There shall be no detectable leakage (individual leaks) in excess of $1x10^{-3}$ $cm^3$/sec in any weld or mechanical joint, except leakage via the drum loadout port and RCS penetration covers shall not constitute failure of the test. Leak test personnel shall be qualified in accordance with SNT-TC.1A.

Leaks that are detected shall be reworked, repaired, and retested until leakage in excess of the allowable rate is eliminated.

2.5.3 Electrical Continuity

After conductor connectors are installed and conductors are labeled, but prior to termination to terminals or devices, an electrical continuity test shall be performed on each conductor using a battery powered buzzer or ohmmeter to determine that all conductors are properly installed and identified.

## 3. ATTACHMENTS

The following documents have been attached to this plan to allow an overview of the work to be performed.

Dwg 519895 Glovebox Connection Section and Details (Reference Only)
Dwg 522000 PGS Installation
Dwg 522001 Glovebox Assembly (Reference Only)
Dwg 522002 Glovebox Work Platform Installation (Reference Only)
Dwg 522004 Glovebox (Reference Only)

# Appendix B

# SPC-388

# Packaging Glovebox Lift Table Performance Specification

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# Performance Specification

# OU 7-10 Glovebox Excavator Method Project Packaging Glovebox System Lift Table

Prepared for:
U.S. Department of Energy
Idaho Operations Office
Idaho Falls, Idaho


Idaho National Engineering and Environmental Laboratory

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5. Author: R. J. Carpenedo / D. E. Keller 5. Owner: S. A. Davies
7. Comments:

REVIEW AND APPROVAL SIGNATURES
Denote R for review concurrence, A for approval, as appropriate.

| 8. Type or Printed Name / Signature | 9. R/A | 9. Date | 10. Organization/ Discipline |
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## FIGURES

# 1. SCOPE

## 1.1 General

This specification documents the requirements for design, fabrication, assembly, integration, testing, packaging, and shipping of the packaging glovebox system (PGS) lift table for the Operable Unit (OU) 7-10 Glovebox Excavator Method Project. The lift table is part of the project that will demonstrate the feasibility of waste retrieval and repackaging at OU 7-10 (Pit 9) within the Subsurface Disposal Area of the Radioactive Waste Management Complex at the Idaho National Engineering and Environmental Laboratory (INEEL) located near Idaho Falls, Idaho.

The lift table will be used to move standard 55- and 85-gal drums from the floor of the drum loadout enclosure up to the glovebox drum loadout stations. A turntable on the lift table will allow rotation of the drum. The drums will hold the repackaged waste that will be removed from OU 7-10.

## 1.2 Work Included

The subcontractor shall provide all labor, material, equipment, and services necessary to design, fabricate, assemble, test, package, and deliver the quantity of lift tables, complete and in accordance with this specification, subject to terms and conditions of the contract or purchase order. The work includes, but is not limited to, the following:

A. Design of the lift table

B. Fabrication and assembly of the lift table

C. Fabrication of the spacer-mounting base (if the subcontractor indicates that one will be required.)

D. Performance of all inspections and testing as specified herein

E. Preparation of installation, operation, and maintenance documentation as described herein

F. Provision of all crates, skids, protective devices, lifting lugs, and materials used for shipping and handling to the INEEL

G. Packaging and shipping of the lift table and associated hardware to the INEEL.

1.3 Work Not Included

A. Final installation of the lift table and integration with INEEL facility systems will be the responsibility of the INEEL management and operating contractor and is not within the scope of this specification.

## 2. APPLICABLE CODES, PROCEDURES, AND REFERENCES

The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issue in effect on the date of invitation to bid shall apply. In the event of a conflict between the documents referenced herein and the contents of this specification, the contents of this specification shall be considered a superseding requirement.

2.1 National and Local Codes

Occupational Safety and Health Administration (OSHA) *Code of Federal Regulations* (CFR)

29 CFR 1910.212 "Machinery and Machine Guarding—General Requirement for all Machines"

National Fire Protection Association (NFPA)

NFPA 70 through 99 National Electric Code (ANSI 2001).

2.2 Industry Procedures

American National Standards Institute—Material Handling Institute

ANSI MH29.1 "Safety Requirements for Industrial Scissor Lifts."

## 3. SUBMITTALS

3.1 General

Vendor data shall be submitted as instruments of the subcontractor; therefore, before submittal, the subcontractor shall ascertain that material and equipment covered by the submittal and the contents of the submittal itself meet all the requirements of the subcontract specifications, drawings, and other contract documents.

Each submittal shall contain identification for each separable and separate piece of material, equipment, and literature with respect to the information provided in the specification and on the Vendor Data Schedule. Submittals shall be numbered consecutively for each different submittal.

Vendor data required by this specification to support design, fabrication, testing, and shipment is identified on the Vendor Data Schedule. The Vendor Data Schedule provides a tabular listing by specification, reference, and description of the item or service. The type of submittal is identified by a vendor data code, and the time required to submit the item is identified by a when-to-submit code. An approval code specifies whether the submittal is for Mandatory Approval or for Information Only. One copy of routine paper or electronic file submittals is required; however, additional copies may be required by the Vendor Data Schedule. Note: Electronic file submittals are preferred.

All vendor data shall be submitted to the contractor using Form 431.13, "Construction Vendor Data Transmittal and Disposition Form." Form 431.13 provides the subcontractor with a convenient method to submit vendor data and provides the contractor with a means of dispositioning the submittal. The subcontractor shall list the Vendor Data Schedule item number, a vendor data transmittal tracking number (if applicable), specification number reference, a tag number (if applicable), the submittal status (e.g., mandatory approval, information only, resubmittal, or or-equal), the revision level, and the item description.

Comments by the contractor and required action by the subcontractor will be indicated by a disposition code on the submittal. The disposition codes will be classed as follows:

Work May Proceed: Submittals so noted will generally be classed as data that appears to be satisfactory without corrections.

Work May Proceed with Comments Incorporated. Revise Affected Sections and Resubmit: This category will cover data that, with the correction of comments noted or marked on the submittal, appear to be satisfactory and require no further review by the contractor before construction. Revised drawings shall be provided upon request.

Work May NOT Proceed. Revise and Resubmit: Submittals so dispositioned will require a corrected resubmittal and approval before proceeding with work for one of the following reasons:

1. Submittal requires corrections, in accordance with comments, before final review

2. Submittal data are incomplete and require more detailed information before final review.

3. Submittal data do not meet subcontract document requirements.

Accepted for Use. Information Only Submittal: Submittals so dispositioned will generally be classified as Information Only for as-specified material and equipment.

Mandatory-Approval coded vendor data will be reviewed by the contractor and receive an A, B, or C disposition. Information Only submittals without comments will receive a D disposition. A-, B-, and C-coded dispositioned submittals will be returned to the subcontractor. Submittals dispositioned as D-coded will not be returned to the subcontractor. The contractor may provide internal review of Information Only submittals. In the event that comments are generated on an Information Only submittal, the submittal may be dispositioned B or C and be returned to the subcontractor for appropriate action. Acknowledgment of receipt of dispositioned vendor data by the subcontractor will not be required.

The contractor will return dispositioned submittals with reasonable promptness. The subcontractor shall note that a prompt review is dependent on timely and complete submittals in strict accordance with these instructions.

All vendor data must be dispositioned as A or D before the subcontract can be considered complete.

Where submittal of data items such as drawings, vendor data, and analysis, require approval or concurrence, the contractor will return such concurrence, corrections, or comments to the subcontractor within 5 working days after receipt of the submittal. Where corrections are required, the subcontractor shall submit corrected drawings, analysis, or other work, until approval is granted, at which time the contractor will return one approved and signed copy to the subcontractor. It is not the intent of the contractor to be obstructive, arbitrary, or capricious in reviewing data submittals, but to simply ensure compliance with the intent and requirements of this specification.

Contractor approval of drawings does not imply that the contractor accepts any responsibility for errors that may result in component reworks, schedule delays, or increased fabrication costs.

3.2 Vendor Data Schedule

The following information shall be submitted by the subcontractor as indicated on the Vendor Data Schedule.

3.2.1 Schedule

The subcontractor shall prepare a schedule 10 days after award of the subcontract identifying when the following action items will be completed: lift table design, fabrication, testing, packaging, and shipment to the INEEL. The fabrication schedule shall be provided to the contractor for approval in accordance with the Vendor Data Schedule. In addition, the subcontractor shall provide, for contractor approval, a revised schedule within 7 working days of any modification to the subcontract that revises the scheduled delivery date.

3.2.2 Design Verification Documentation

Upon completion of the design, the subcontractor shall submit information that allows the contractor to verify that the design of the lift table meets the requirements of this specification. The information shall include as a minimum, overall configuration, design calculations, test procedure(s), and installation instructions.

It is preferred that all drawings submitted by the subcontractor be prepared using AutoCAD (Rev. 2002) or Mechanical Desktop (Rev. 6); however, the subcontractor may use any format that can be easily converted to the AutoCAD drawing format.

3.2.3 Test Procedure

The subcontractor shall prepare and submit a procedure that documents the testing that will be performed to verify the operability of the lift table.

3.2.4 Test Report

The subcontractor shall prepare and submit a report documenting the testing that was performed to verify the operability of the lift table. The report shall document the results of the tests.

3.2.5 Assembly Drawings

The subcontractor shall prepare and submit assembly drawings that can be used during routine maintenance or repair of the lift table.

3.2.6 Installation Instructions

The subcontractor shall prepare and submit instructions that will allow the contractor to install the lift table.

3.2.7 Electrical Diagrams

The subcontractor shall prepare and submit electrical diagrams that can be used during routine maintenance or repair of the lift table.

3.2.8 Hydraulic Diagrams .

The subcontractor shall prepare and submit hydraulic schematics (if hydraulics are used) that can be used during routine maintenance or repair of the lift table.

3.2.9 Operation and Maintenance Manual

The subcontractor shall prepare and submit a Lift Table Operation and Maintenance Manual.

3.2.10 Parts List

The subcontractor shall prepare and submit a parts list for the lift table.

3.2.11 Recommended Spare Parts

The subcontractor shall prepare and submit a list of suggested spare parts for the lift table. The spare parts list shall include cost of the parts for a given length of time and where the parts can be obtained if not from the subcontractor.

3.2.12 Special Tools List

The subcontractor shall prepare and submit a list of any special tools required for maintenance or repair of the lift table. The special tools list shall include cost of the tools for a given length of time and where the parts can be obtained if not from the subcontractor.

# 4. DESIGN

The lift table shall be designed in accordance with the following requirements (see Figure 1 for reference).

## 4.1 Pit Mounted

The lift table shall be designed to be pit mounted. The inside pit dimensions are 40 in. long × 32 in. wide × 17 in. deep. The pits will be made using 3/16-in. carbon steel plate for the sides and bottom. The pits will be painted. No access exists under the pit enclosure.

The lift table shall be designed to fit inside the pit with a maximum gap between the pit wall and the lift table platform of 1/2 in. when the lift table is in the lowered position.

## 4.2 Travel

The lift table vertical travel shall be 30 in. The subcontractor shall identify the lift speed options to the contractor based on the subcontractor's current design and experience in the proposal. The lift table will be used to place a drum into a loading ring and must be capable of relatively slow speed to allow correct drum placement and fit up. The initial estimate for the lift slow speed is between 20 and 30 in. per minute.

## 4.3 Turntable

A turntable shall be mounted to the lift table platform. The turntable diameter shall be a minimum of 28 in. with a maximum of 30 in. The diameter of the turntable shall be selected by the subcontractor to best fit available hardware or design. The turntable shall be centered on the lift table platform. The turntable shall be hand operated.

The turntable shall be designed with an electrically operated latching mechanism. When engaged, the latching mechanism will prevent the turntable from turning. The latching mechanism shall disengage when the electrical circuit is engaged. The latching mechanism shall be disengaged by a foot-operated switch box that can be placed on the floor next to the lift table. This will allow the operator to keep both hands on the drum when the turntable is disengaged. When the operator's foot is removed from the switch box the latching mechanism shall engage the turntable within 45 degrees of rotation.

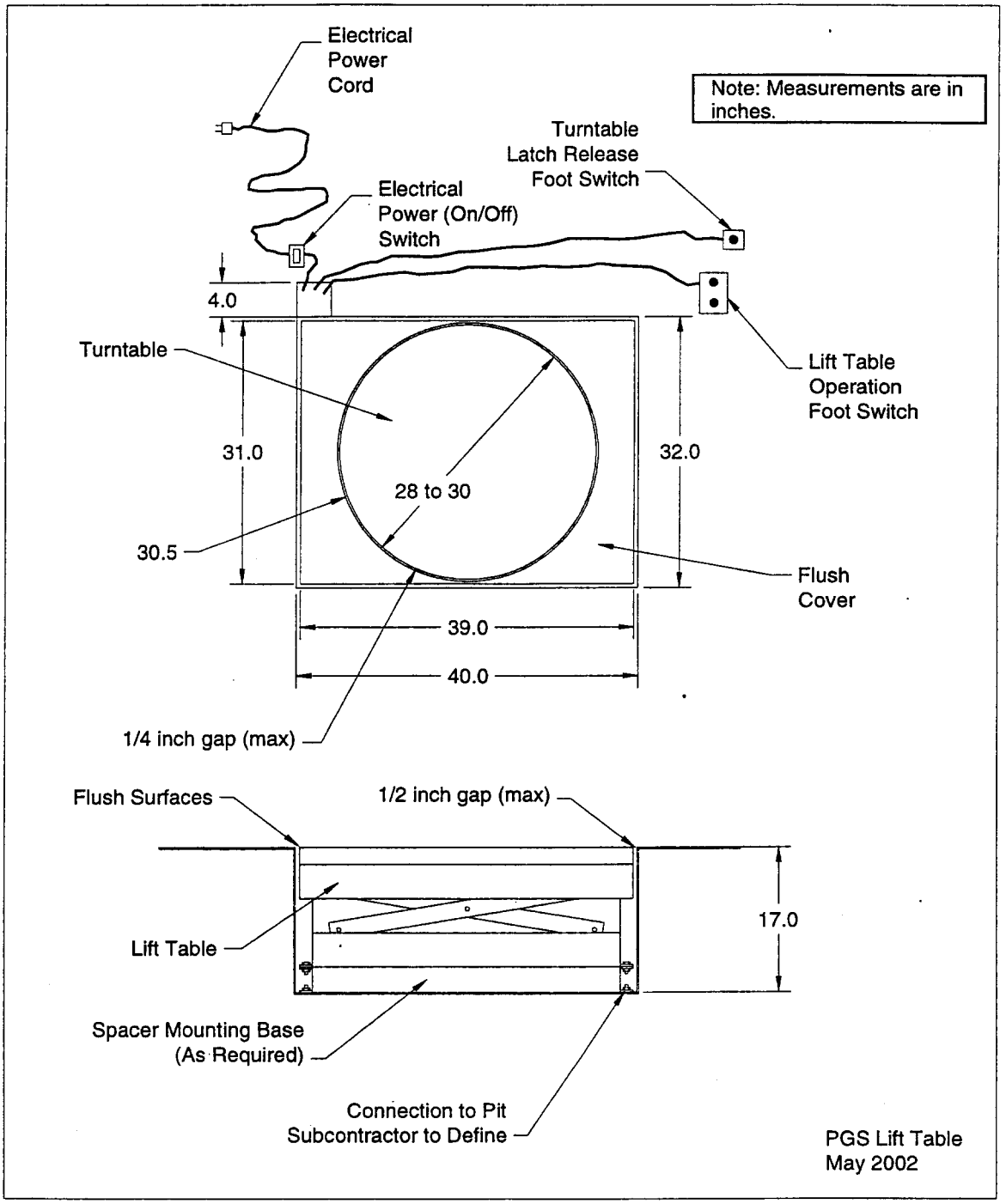


Figure 1. Diagram of OU 7-10 Glovebox Excavator Method Project lift table design.

4.4 Flush Mount

The turntable, when in the lowered position, shall be at the same elevation as the facility floor (flush). The area above the lift table platform around the turntable shall be filled in with a flush cover that is designed to bear the design load. This also may be accomplished by insetting the turntable into the lift table platform. The subcontractor shall decide how to achieve the flush-floor requirement. A maximum gap of 1/4 in. shall be allowed between the turntable and the flush cover or lift table platform.

4.5 Capacity

The lift table shall be designed to lift and lower a 1,000-lb load when the load is centered on the turntable. The lift table shall be designed to withstand a 1,500-lb load at the edge of the platform when in the lowered position.

Note: A drum transporter will be used to remove the drums from the lift table in the lowered position. The wheels on the drum transporter will be on the edge of the lift table during drum removal so the lift table will have to support a side load of up to 1,500 lb (weight of the loaded drum and the transporter) during drum removal.

4.6 Load Table Drift

The lift table shall indefinitely support a fully loaded drum (1,000 lb) with a maximum downward drift of 1/4 in. Note that this exceeds the requirements of the ANSI MH29.1 time limit of 20 minutes.

If the lift table cannot meet this requirement, then a mechanical support shall be provided that can be installed when the lift table is in the up position to prevent drifting.

4.7 Spacer Structure

If the lift table does not require the entire depth of the pit to meet the flush requirement when in the completely lowered position, the subcontractor shall provide a spacer-mounting base to mount underneath the lift table to meet the flush-mount requirement.

4.8 Actuation and Controls

The lift table shall be powered using 110V single-phase power. All equipment required to operate the lift table shall be internally mounted within the envelope

of the lowered lift table. The lift table shall be actuated using an electrically driven hydraulic or mechanical system. No pneumatic systems shall be used.

An on/off switch shall be provided that will be placed on the floor next to the lift table where the power cord enters the pit, as shown in Figure 1. The power cord shall be a minimum of 10 ft long after the on/off switch.

Electrically controlled foot switches shall be used to control the vertical movement of the lift table and the latching mechanism on the turntable. The foot switch cords shall be a minimum of 8 ft long. The foot switches shall be designed to prevent inadvertent use (i.e., a cover over the switch or some other means of protection). The electrical connection shall be a standard three-prong plug.

An adjustable upward travel limit switch shall be incorporated into the lift table.

4.9 Safety

The lift table shall, as a minimum, meet the requirements of 29 CFR 1910.212 and ANSI MH29.1. Beveled-edged toe guards or electronic toe sensors shall be incorporated.

4.10 Bellows

A bellows or skirt shall extend with the platform. The design shall permit air to flow into the area behind the bellows to prevent damage or collapse.

4.11 Pit Interface

Lifting connections shall be installed on the lift table to allow it to be placed into the pit. A method to allow the lift table to be connected to the pit shall be identified by the subcontractor. This may include a removable platform or access holes through the platform to allow access to the pit connection hardware.

4.12 Fire Safety

The hydraulic fluid shall be Factory Mutual Approved "Less Flammable" in accordance with Factory Mutual Global Property Loss Prevention Data Sheet 7-98, "Hydraulic Fluids," in accordance with *Architectural Engineering Standards* (DOE-ID 2001).

4.13 Miscellaneous

The lift table shall be painted using the manufacturer's standard paint.

# 5. MANUFACTURING AND ASSEMBLY

## 5.1 General

The lift table shall be assembled in the subcontractor's shop to assure proper fits and operation. The assembled lift table shall be placed into an enclosure simulating the pit and verified to operate in accordance with the requirements of this specification.

The contractor's technical representative or designated alternate shall inspect the operation of the assembled final product before shipment to the INEEL.

## 5.2 Materials

The lift table shall be manufactured using materials as specified by the subcontractor to meet the performance requirements of this specification.

## 5.3 Cleaning, Painting, and Coating

The lift table shall be prepared and painted as specified by the subcontractor. The subcontractor shall define the available paint colors to the contractor. The contractor shall determine the color during design verification review.

## 5.4 Spare Parts

No spare parts shall be included in the proposal, only the identification of recommended spares and the associated cost.

# 6. QUALITY ASSURANCE

## 6.1 Program

The lift table shall be manufactured in accordance with the subcontractor's quality program requirements.

## 6.2 Nondestructive Examination

All nondestructive examination shall be in accordance with the subcontractor's requirements.

## 6.3 Operational Testing

Operational testing on the lift table shall be performed by the subcontractor before shipment to the INEEL.

6.4 Inspection

The lift table shall be subjected to a visual or mechanical inspection to verify compliance with the requirements. This includes appropriate inspections or tests to verify compliance with this specification.

6.4.1 Operability Tests

The subcontractor shall plan and perform operability tests on the lift table to verify compliance to the requirements of this specification.

6.4.2 Drum Lift-Load Test

The subcontractor shall plan and perform a load test on the lift table. The lift table shall be load tested to 1,250 lb (-5%, +0%). The test load shall be rotated at the full UP, full DOWN, and at three intermediary positions of approximately 25% of the stroke of travel. The loaded platform shall be tested to verify that the platform remains at the positions of 25, 50, 75, and 100% of travel for 20 minutes. Measurements shall be made at the beginning and at the end of the 20-minute time interval to measure vertical drift. The measured elevation change shall not exceed 0.5% (0.15 in.) during the 20-minute interval. If the elevation drift exceeds the allowable limit, the lift platform shall be repaired and retested as necessary.

The vertical drift of the table shall be tested in the 100% position after 2 hours. No more that 1/4 in. of drift is allowable. If the table drift exceeds the allowable distance, the mechanical support (see Section 4.6) shall be employed to prevent drift.

After completion of the load test, all load-bearing members of the lift platform shall be visually inspected to verify that no part subject to wear or distortion has been adversely affected by the load test.

# 7. PACKAGING AND SHIPPING

7.1 Packing and Packaging

The subcontractor shall provide adequate protection for shipping the fabricated components to the INEEL without damage. Particular care shall be exercised to ensure that the surface finish, cleanliness, dimensional stability, and overall integrity of the equipment achieved during fabrication are not impaired during shipment.

7.2 Marking and Handling

Crates shall be marked with the contract number, the actual weight of the loaded crate, the assembly orientation in the crate, and the contents of the crate. Bulky items or pallets requiring movement by forklift or crane shall have the weight conspicuously identified or labeled. Handling and storage instructions shall be permanently marked on or attached to the shipping crate.

7.3 Special Transportation Requirements

The subcontractor is responsible for all necessary packaging and shipping. The subcontractor shall notify the contractor of the method of shipment, waybill number, pick-up date, and other relevant information immediately following delivery to or pick-up by the shipper. An itemized packing list shall accompany the shipment.

## 8. REFERENCES

29 CFR 1910.212, 2002, Title 29, "Labor," Part," Part 1910, "Machinery and Machine Guarding, Subpart 212, "General Requirement for all Machines," *Code of Federal Regulations*, Office of the Federal Register.

ANSI, 2001, *2002 National Electric Code,* ANSI/NFPA.70 2002, American National Standards Institute, National Fire Protection Association, September 1, 2001.

ANSI MH29.1, 1994, "Safety Requirements for Industrial Scissor Lifts," American National Standards Institute Material Handling Institute.

DOE-ID, 2001, *Architectural Engineering Standards*, Rev. 28, U.S. Department of Energy Idaho Operations Office, Idaho Falls, Idaho,
URL: http://www.inel.gov/publicdocuments/doe/archeng-standards/default.shtml.

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# Appendix C

# PLN-1076

# Sequential Process Narrative for RCS Backhoe Installation

Document ID: PLN- 1076
Revision ID: 0
Effective Date: 6/11/02

# Plan 1076

# Glovebox Excavator Method Project – RCS Backhoe Installation Plan

## Operable Unit 7-10 (OU 7-10) Staged Interim Action Project, Stage II

[The following statement is optional:
Prepared for:
U.S. Department of Energy
Idaho Operations Office
Idaho Falls, Idaho]

INEEL
Idaho National Engineering & Environmental Laboratory
BECHTEL BWXT IDAHO, LLC

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|---|---|---|---|
| 1. Document Identifier: | SLN-1076 | 2. Project File No. (optional): | 021052 |
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# CONTENTS

# FIGURE

# ACRONYMS

| | |
|---|---|
| FFS | Facility Floor Structure |
| OH | Over head |
| OU | Operable Unit |
| PGS | Packaging Glovebox System |
| RCS | Retrieval Confinement Structure |
| WES | Weather Enclosure Structure |

# Backhoe Installation into the RCS

## 1. INTRODUCTION

The Glovebox Excavator Method Project (Glovebox Excavator Method Project), shown in Figure 1, incorporates a retrieval confinement structure (RCS) located over the Glovebox Excavator Method Project excavation site. The RCS consists of a steel-framed, steel-paneled structure with Lexan windows. The RCS structure is located within a larger fabric-skinned weather enclosure structure (WES). Packaging glovebox systems (PGS) are attached directly to the confinement structure and are fed by track guided transfer carts.

A standard backhoe performs soil excavation, waste excavation, probe removal, drum sizing, drum puncture, and core sampling (utilizing a jackhammer / core sampler design). As shown in Figure 1, the backhoe boom and stick are housed within the RCS while the operator and other excavator components are located outside the RCS and within the WES.

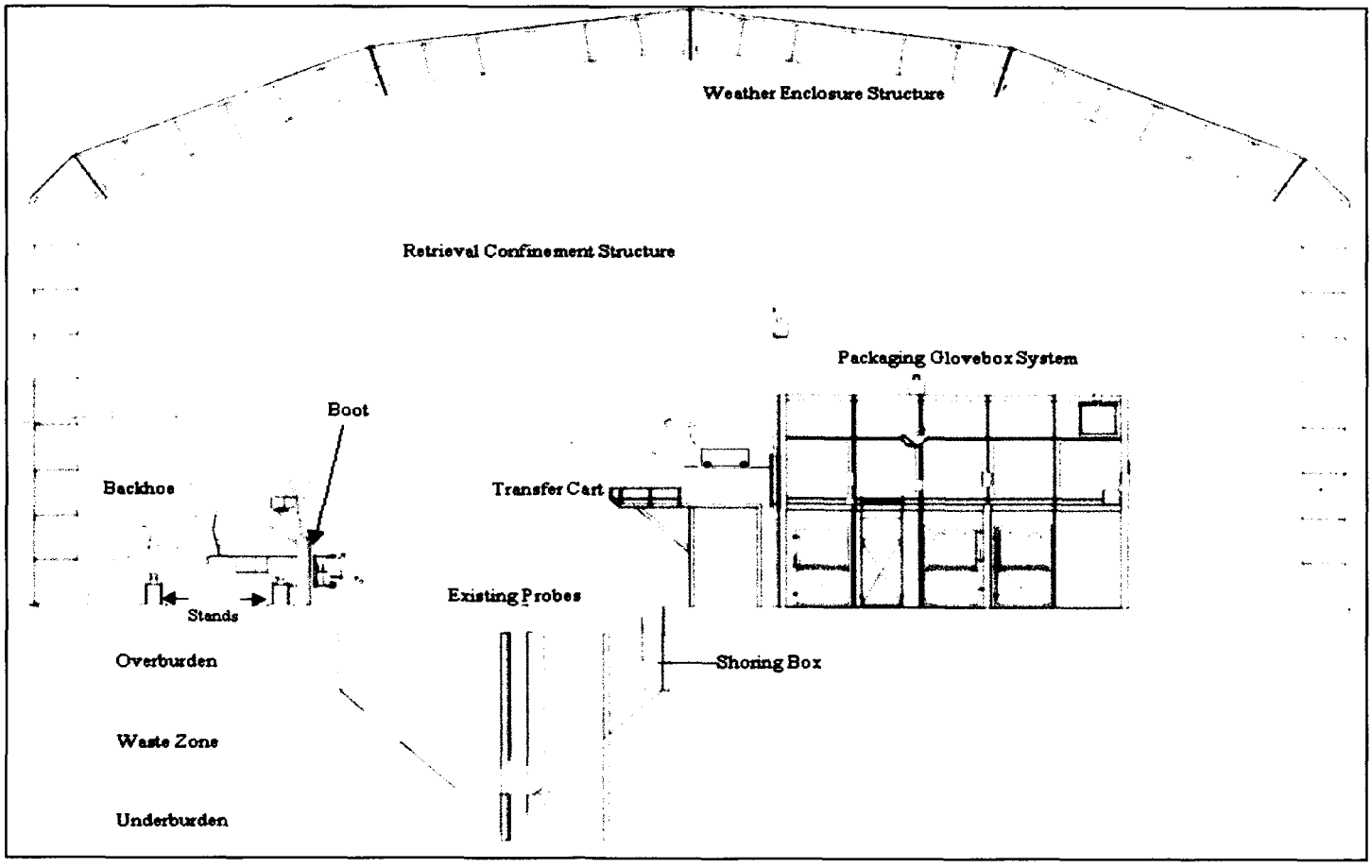


Figure 1. Glovebox Excavator Method Project

## 1.1 Purpose of the Document

This document is intended to provide Operable Unit (OU) 7-10 Glovebox Excavator Method Project Facilities Package Subcontractor with the intended plan for the installation of the 446B backhoe (and associated external boot assembly) into the RCS facility. The subcontractor shall follow this plan, submit an alternate plan of equal detail, or provide proposed changes to this plan in writing for approval. The Backhoe Instillation Flow Diagram, shown in Figure 18, presents the flow sequence of the operational tasks to be performed. An installation of the 446B backhoe into the RCS facility consists of tasks performed to correctly position and secure the backhoe to the facility floor structure (FFS) and to insure correct backhoe outer boot alignment and installation.

This document divides the backhoe installation activities into eight categories. The Facilities Package Subcontractor performs categories 1 through 7. The Subcontractor shall acquire the services of the Pocatello offices of Western States Equipment Company (an authorized service representative of Caterpillar Tractor Corporation) to perform category 8. These categories are:

1. Attachment of rear support assemblies and front axial assemblies to the backhoe and the facility floor structure (FFS).
2. Attachment of brace assemblies to the rear support assembly and the FFS.
3. Attachment of the front support assemblies to the backhoe loader arms and the FFS.
4. Securing of the loader arm adjustment assemblies.
5. Adjust swing shims to prevent RCS rupture during full 90° boom swing.
6. Attachment of the outer boot assembly to the RCS.
7. Additions of drip pans and exhaust ducting.
8. Hydraulic disconnection and capping of the brakes, loader system, and steering.

The subcontractor shall notify the Contractors representative three (3) days prior to commencing work on category 5, category 6, category 7, and category 8.

Figure 2 presents the 446B backhoe (shown in red) equipped with the structural tie-down equipment (shown in black). The Tie-down equipment is used to secure the backhoe to the FFS and the drip pans prevent the spread of backhoe fluids. Drawing 519933 shows the details of the assembly and installation.

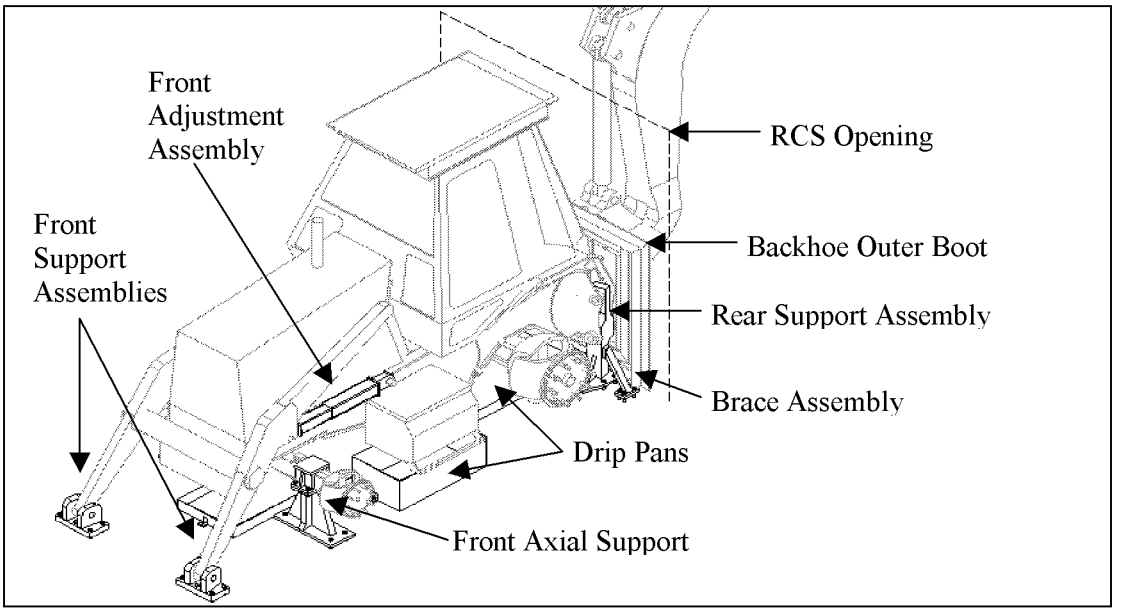


Figure 2. Backhoe Installation Into RCS

## 1.2 Prerequisites to Backhoe Installation

The following are a partial list (listed in no particular order) of tasks and /or events that must be completed prior to backhoe installation within the RCS facility.

- The backhoe rear stabilizer linkage and associated hydraulic cylinders are disconnected and completely removed from the backhoe.
- The backhoe stabilizer cylinder hydraulic lines are capped as per drawing 519933-Photo 8.
- The front loader bucket with associated hydraulic tilt cylinders and linkage are disconnected and completely removed from the loader arms.
- The loader arm tilt cylinder hydraulic lines are disconnected, capped, and removed.
- The loader arm lift cylinders are replaced with front adjustment assemblies as per drawing 519906 to support the loader arm ends approximately two-feet off ground level.
- The loader arm lift cylinders hydraulic lines are capped as per drawing 519933-Photo 9.
- The RCS Lexan windows, located directly above the RCS backhoe penetration, and all associated hardware are removed.
- Handrails, bordering the excavation site, adjacent to the RCS/backhoe penetration are removed.

- The 12-foot by 16-foot overhead door, in the WES directly across from the RCS/backhoe penetration, is opened.
- Extendable backhoe stick is fully retracted
- Counter sunken holes (drilled and tapped) machined within the boom swing stop plates as per drawing 519933. Stack of boom swing stop plates installed onto backhoe.
- Excavator exhaust ducting, to insure that the excavator exhaust is directed from the WES, is installed.
- Hydraulic hose change outs and modifications are complete.
- Installation of the inner and outer backhoe seals are complete.

# 2. STEP-BY-STEP DESCRIPTIONS

## 2.1 Attaching the Rear Support & Front Axial Assemblies (Facilities Package Subcontractor)

### 2.1.1 Position Backhoe Within the RCS Opening

Once all prerequisites have been completed the 446B backhoe is driven into position within the RCS opening. This is accomplished by positioning the backhoe swing boom pivot point a minimum of 25-feet away from the 12-foot by 16-foot WES OH door (directly across from and perpendicular to the RCS/backhoe penetration), placing guide marks on the facility floor structure (to aid the operator in correctly positioning the backhoe within the RCS opening), positioning the boom and stick perpendicular to the operator cab, fully uncurl the boom and stick, and lowering both boom and stick until the bucket is approximately one foot from the facility floor structure. The backhoe is then slowly driven along the guide marks through the WES OH door while the boom, stick, and bucket is maneuvered through the RCS/backhoe penetration. The backhoe boot/RCS alignment is then verified. If the backhoe outer boot (mounted on the exterior of the backhoe frame) is not aligned with and centered within the RCS opening the backhoe must be removed, repositioned outside the OH door, and slowly driven back into position. This process is repeated until backhoe boot alignment is accomplished.

### 2.1.2 Jack the Front of the Backhoe and Remove the Font Tires

Following backhoe alignment, the rear backhoe tires are secured, two hydraulic bottle jacks are placed under the front counter weight, and the backhoe front is lifted until the majority of the backhoe weight is removed from the front tires. The lug nuts are then loosened on each front tire. Continue jacking machine until the tires spin freely. Block or crib the front end of the backhoe to prevent accidental fall off or failure of the hydraulic jacks (Note: The blocks of cribs should not be taller than the capless front axial supports). Remove the lug nuts from both front tires. Remove both front tires.

### 2.1.3 Position the Front Axial Supports on the FFS and Lower the Backhoe

The front axial support assembly (drawing 519933-5), without the front axial support caps, are strategically placed on the facility floor structure directly beneath the elevated backhoe front axial. The backhoe is then lowered until the front axial is nearly touching the two front axial supports. The supports positions are then adjusted to the appropriate locations as shown in Figure 3.

Upon accurate support positioning, the backhoe is lowered until the full weight of the backhoe rests on the front axial supports.

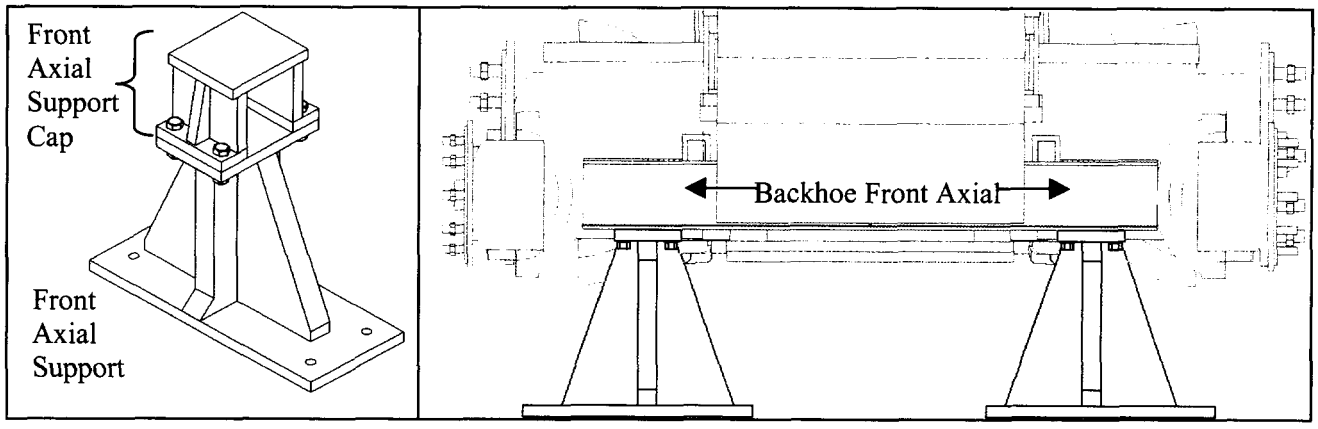


Figure 3. Front Axial Supports

### 2.1.4 Jack Rear of the Backhoe & Attach Rear Support Assemblies onto Backhoe Stabilizer Support Frames

Place two hydraulic bottle jacks under the rear axial support located behind both the right and left rear tires. To prevent the backhoe from tipping off the front axial supports during elevation of the rear axial, place additional supports under the front of the backhoe. Lift the rear of the backhoe until the majority of the backhoe weight is removed from the rear tires. The rear support assemblies (drawings 519933-6 and 519933-7) are then positioned within the backhoe stabilizer support frames as shown on Figure 4. Following rear support assembly insertion into the right rear and left rear stabilizer support frames, install the salvaged upper and lower mounting pins.

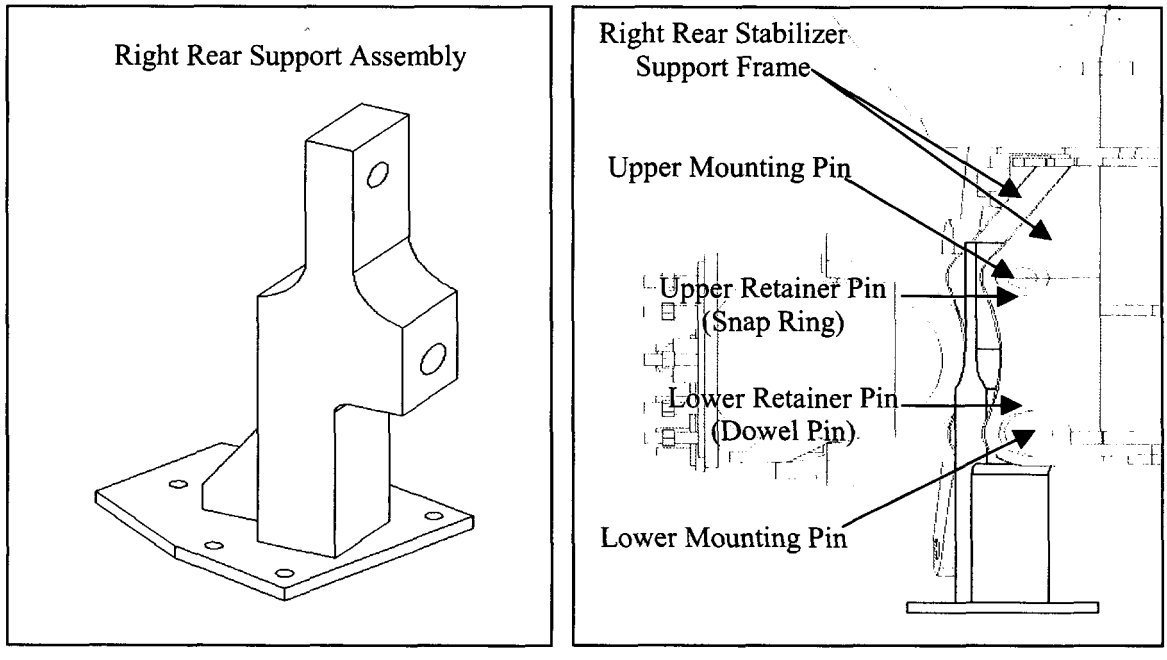


Figure 4. Right Rear Support Assembly

### 2.1.5 Remove the Rear Tires & Lower the Backhoe

Continue jacking machine until the tires spin freely. Remove the lug nuts from both rear tires. Remove both rear tires.

Upon tire removal, the backhoe is lowered until the full weight of the backhoe rests on the rear support assemblies.

### 2.1.6 Insure that the Front Axial Support Caps Fit Securely Around Front Axial

The front axial support caps (drawing 519933-5) are fit around the front axial and mated with the front axial supports as shown in Figure 5. If the positions of the front axial supports do not facilitate a secure fit of the front axial support caps the front of the backhoe must again be elevated and the front axial supports relocated. This is repeated until a secure fit of the front axial support caps is achieved as per drawing 519933. Upon secure fit of the front axial support caps, mark the axial to insure proper front support assembly fit during final backhoe installation.

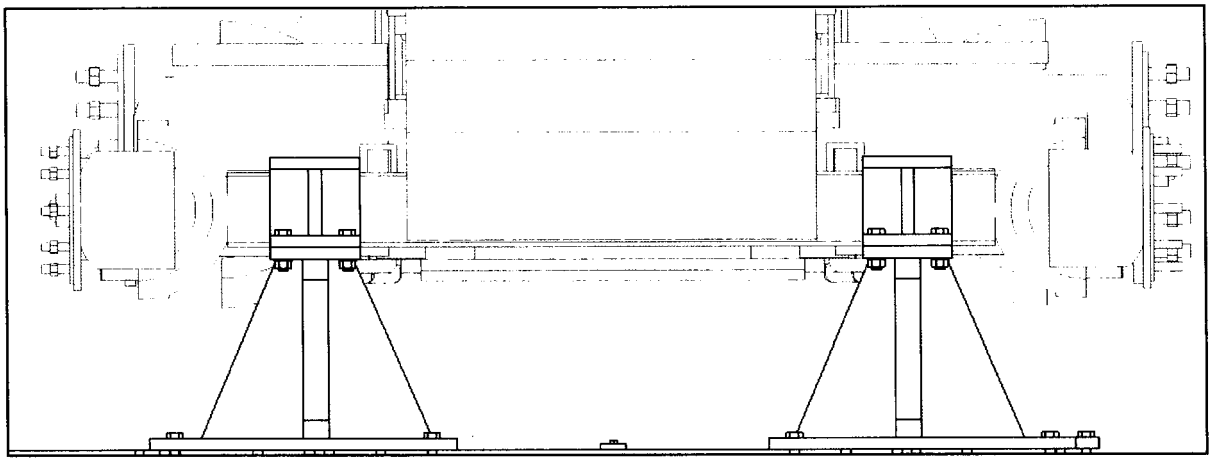

Figure 5. Supporting the Backhoe's Front Axial with Front Axial Supports and Caps

### 2.1.7 Install the RCS Windows and Associated Hardware Around the Backhoe Boot

After the backhoe is securely resting on the front and rear supports, the RCS windows and associated hardware (including the bottom boot channel 519933-16) are fit around the backhoe outer boot as shown on Figure 6 and drawing 519933.

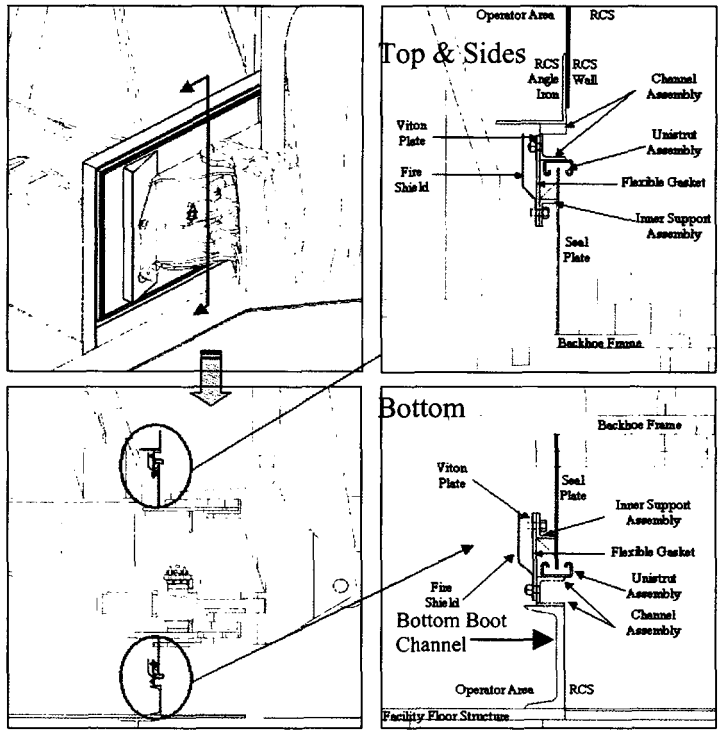


Figure 6. Backhoe Boot / RCS Interface

### 2.1.8 Insure that the Backhoe Boot Aligns With the RCS Opening

If a secure fit between the RCS structure and the backhoe outer boot can not be accomplished (due to backhoe positioning); the RCS windows and associated hardware will be removed, the backhoe front axial supports and rear support assemblies will be removed, and the tires replaced on the backhoe. The backhoe will then be accurately positioned within the RCS opening through application of steps 2.1.1 through 2.1.7.

### 2.1.9 Remove the RCS Windows and Associated Hardware Around the Backhoe Boot

If a secure fit between the RCS structure and the backhoe outer boot can be accomplished (due to proper backhoe positioning); the RCS window and associated hardware will be removed.

### 2.1.10 Mark the Rear Support and Front Axial's Base Plate Hole Pattern on the FFS

Using the base plates on the rear support assemblies as templates and the base plates on the front axial supports as templates, bolt hole patterns are marked on the facility floor structure.

### 2.1.11 Jack the Front of the Backhoe and Remove the Front Axial Supports

Following the marking of bolt hole patterns on the FFS, the backhoe must be removed to provide room for drilling and tapping of the bolt hole patterns. The first step for backhoe removal incorporates removal of the front axial supports. To remove the front axial supports, place two hydraulic bottle jacks under the front counter weight and lift the backhoe until the front axial is elevated off the top of the front axial supports. Remove front axial supports. Retain the front axial blocks or cribs.

### 2.1.12 Install the Front Tire and Lower the Backhoe

Install the right and left front tires and associated lug nuts onto the front spindles and hand tighten. Lower the backhoe until the front tires no longer spin freely. Secure the lug nuts per manufacturers torque requirements onto each tire. Lower the backhoe until the front tires support the full weight of the backhoe. Remove the jacks. Remove the blocks or cribs.

### 2.1.13 Jack the Rear of the Backhoe and Remove the Rear Supports

Following reinstallation of the front tires, the rear tires are reinstalled. The first step in reinstalling the rear tires is the removal of the rear supports. To remove the rear supports, secure the front backhoe tires, place two hydraulic bottle jacks under the rear axial support located behind both the right and left rear spindles. Elevate machine until the rear support assemblies are elevated off the FFS. Block or crib the rear end of the backhoe to prevent accidental fall off or failure of the hydraulic jacks. Remove dowel pins and snap rings. Remove upper and lower retainer pins. Remove rear support assemblies from rear stabilizer support frames.

### 2.1.14 Install the Rear Tire and Lower the Backhoe

Install the right and left rear tires and associated lug nuts onto the rear spindles and hand tighten. Lower the backhoe until the tires no longer spin freely. Secure the lug nuts per manufacturers torque requirements onto each tire. Lower the backhoe until the rear tires support the full weight of the backhoe. Remove the jacks. Remove the blocks or cribs.

### 2.1.15 Drive Backhoe Away from the RCS to Provide Clearance for Drill and Tap

Drive backhoe away from the RCS while maintaining proper alignment with the RCS/ Boot penetration. Backhoe relocation is halted upon access to the templated bolt hole patterns (for drilling and tapping).

### 2.1.16 Drill and Tap FFS to Match Templated Bolt Hole Patterns

Drill and tap the templated FFS bolt hole patterns as per drawing 519933.

### 2.1.17 Position Backhoe Within RCS Opening

Position the backhoe within the RCS opening as indicated in step 2.1.1.

### 2.1.18 Jack the Front of the Backhoe and Remove the Font Tires

Remove the front backhoe tires as indicated in step 2.1.2.

### 2.1.19 Position the Front Axial Supports on the FFS and Lower the Backhoe

Position the front axial supports over the templated bolt hole patterns and lower the backhoe as indicated in step 2.1.3.

### 2.1.20 Jack the Rear of the Backhoe and Attach Rear Support Assemblies on the Backhoe Stabilizer Support Frames

Jack the rear of the backhoe and attach the rear support assemblies on the backhoe stabilizer support frames as indicated in step 2.1.4. Fasten the retainer pins (dowel pins and snap rings) onto/into the upper and lower mounting pins.

### 2.1.21 Remove the Rear Tires and Lower the Backhoe

Remove the rear tires and lower the backhoe as indicated in step 2.1.5. Take precautions to align templated bolt hole pattern with rear support assembly base plates.

### 2.1.22 Bolt The Rear Support and Front Axial's Base Plate Assemblies to the FFS

Install and torque bolts to a value between 333 ft/lbs and 368 ft/lbs using a torque wrench in current calibration and scaled such that the above torque values fall above the lower 20% of full scale as indicated on drawing 519933.

### 2.1.23 Bolt Front Axial Support Caps onto Front Axial Supports

Install and torque bolts to a value between 333 ft/lbs and 368 ft/lbs using a torque wrench in current calibration and scaled such that the above torque values fall above the lower 20% of full scale as indicated on drawing 519933.

## 2.2 Attaching the Brace Assemblies (Facilities Package Subcontractor)

### 2.2.1 Position Brace Assemblies on the Rear Support Assemblies

Position the brace assemblies (drawing 519933-8 and -9) so that the bottom base plates are flat against the FFS and the top weld brackets are flat against the lower half of the rear support assemblies as shown in Figure 7.

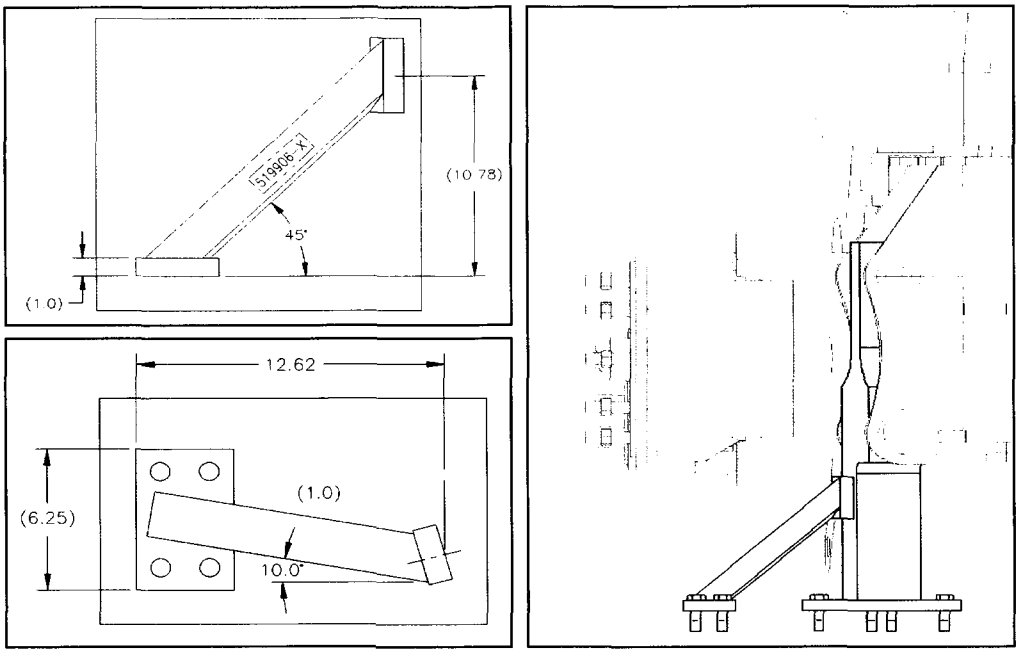


Figure 7. Left Brace Assembly

### 2.2.2 Mark the Brace Assemblies Base Plate Hole Pattern on the FFS

Using the base plates on the brace assemblies as templates, bolt hole patterns are marked on the facility floor structure.

### 2.2.3 Remove the Brace Assemblies from the Rear Support Assemblies

After the bolt hole patterns have been marked for the brace assemblies. The assemblies are removed to allow drilling and tapping.

### 2.2.4 Drill and Tap FFS to Match Templated Bolt Hole Patterns

Drill and tap the templated FFS bolt hole patterns.

### 2.2.5 Relocate Brace Assemblies on the Rear Support Assemblies

Relocate the brace assemblies on the rear support assemblies as shown in Figure 7 also shown on drawing 519933.

### 2.2.6 Bolt The Brace Assemblies to the FFS

Install and torque bolts to a value between 333 ft/lbs and 368 ft/lbs using a torque wrench in current calibration and scaled such that the above torque values fall above the lower 20% of full scale as indicated on drawing 519933.

### 2.2.7 Weld The Brace Assemblies to the Rear Support Assemblies

Weld the brace assembly to the rear support assemblies as indicated on drawing 519933.

## 2.3 Attaching the Front Support Assemblies (Facilities Package Subcontractor)

### 2.3.1 Attach the Front Support Assemblies onto The Front Loader Arm Pins

Following prerequisites, the loader arms are suspended approximately two-feet in the air. The front support assemblies (drawing 519933-3 and -4) are positioned around the ends of the front loader arms as shown on Figure 8. Install the salvaged right and left mounting pins and associated snap rings.

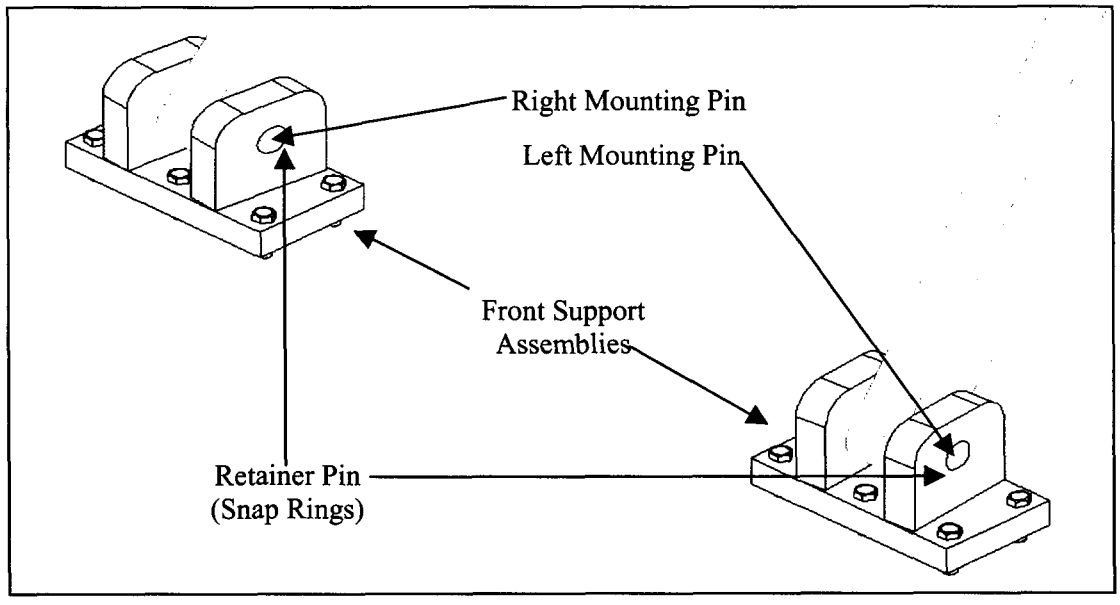


Figure 8. Front Support Assemblies

### 2.3.2 Remove the Front Adjustment Assembly Locking Bolts

Place an elevated bottle jack under the torque tube centerline (tube connecting both loader arms together in front of the backhoe engine compartment). Support weight of loader arms with bottle jack and remove the front adjustment assembly locking bolts shown on Figure 9. This allows the large outer arm to slide freely over the smaller inner arm of the assembly.

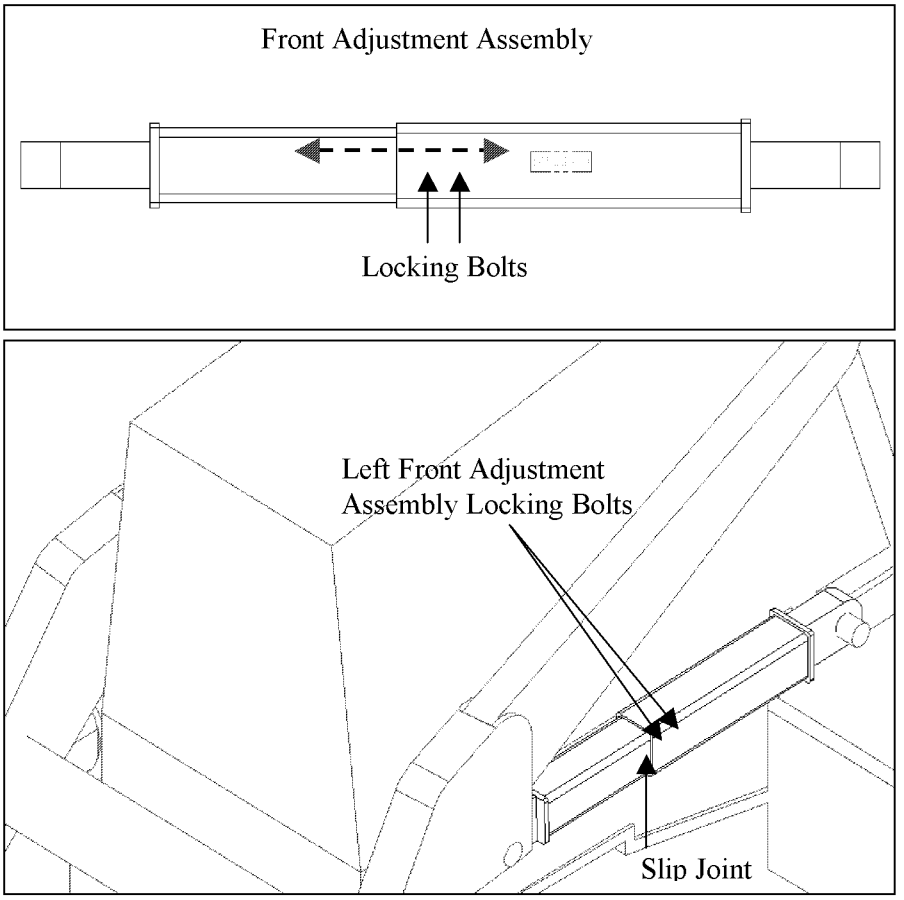


Figure 9. Left Front Adjustment Assembly

### 2.3.3 Lower the Loader Arms Until the Front Support Assemblies Touch the FFS

Lower loader arms with the hydraulic jack, mounted beneath the torque tube, until the front support assembly base plates sit flat against the FFS.

### 2.3.4 Mark the Front Support Assemblies Base Plate Hole Pattern on the FFS

Using the base plates on the front support assemblies as templates, bolt hole patterns are marked on the facility floor structure.

### 2.3.5 Raise the Loader Arms Off the FFS

Raise the loader arms with the hydraulic jack, mounted beneath the torque tube, until the front support assemblies are high enough to gain drill and tap accesses to the bolt hole patterns.

### 2.3.6 Drill and Tap FFS to Match Templated Bolt Hole Patterns

Drill and tap the templated FFS bolt hole patterns.

### 2.3.7 Lower Loader Arms With Front Support Assemblies onto the FFS

Lower loader arms with the hydraulic jack, mounted beneath the torque tube, until the front support assembly base plates sit flat against the FFS.

### 2.3.8 Bolt The Front Support Assemblies to the FFS

Install and torque bolts to a value between 333 ft/lbs and 368 ft/lbs using a torque wrench in current calibration and scaled such that the above torque values fall above the lower 20% of full scale as indicated on drawing 519933.

## 2.4 Secure Front Adjustment Assemblies (Facilities Package Subcontractor)

### 2.4.1 Jack Up Loader Arms (while bolted) to Remove Residual Slack

While the front support assemblies are bolted to the FFS, place an elevated bottle jack under the torque tube centerline. Apply sufficient hydraulic pressure to remove residual slack in mounting pins and loader arm joints.

### 2.4.2 Weld Front Adjustment Assemblies in Place

Upon hydraulic removal of residual slack, the front adjustment assemblies slip joint (shown on Figure 9) is welded into place as per drawing 519933.

### 2.4.3 Remove Hydraulic Jacks from Front Loader Arms

Release hydraulic pressure on the front loader arms and remove the hydraulic bottle jack.

## 2.5 Swing Stop Shims (Facilities Package Subcontractor)

### 2.5.1 Adjust Physical Stop Shims, As Needed, For Right-Left Swing

The backhoe boom and stick will require physical stops to prevent interference of the bucket and RCS. The two main areas of concern are the RCS wall (South of the backhoe) and the glove ports located North of the backhoe.

The 446B backhoe is capable of an 180° swing arc of the boom and stick. With a 24-inch bucket and the pivot point of the boom penetrating into the RCS nearly 12 inches the bucket of the backhoe should not penetrate the RCS wall located south of the backhoe. The 180° swing arc of the boom varies slightly from backhoe to backhoe.

This variation may cause a swing arc greater than 90° from centerline and generate a threat of collision with the RCS south wall as shown in Figure 10.

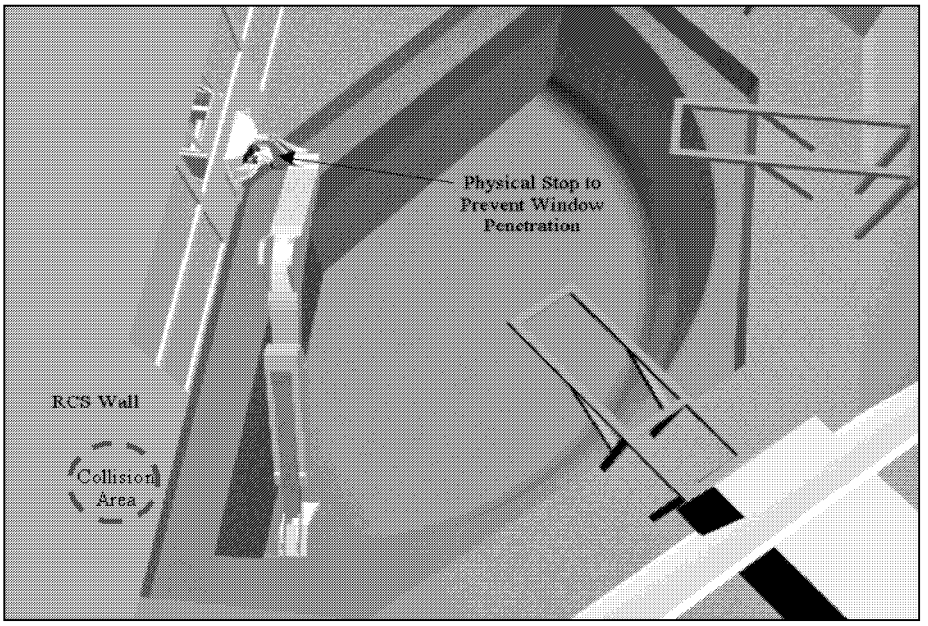


Figure 10. Physical Stop to Prevent South RCS Wall Penetration by End Effector

The glove ports, located North of the backhoe, are also under threat of breach by the backhoe end effectors. The glove ports will be used for removing core samples from the hydraulic hammer (Figure 11), and attachment/detachment of the hydraulic lines on all of the backhoes end effectors (Figure 12). Without a physical stop, the backhoe hydraulic hammer and bucket may have the ability to penetrate the RCS.

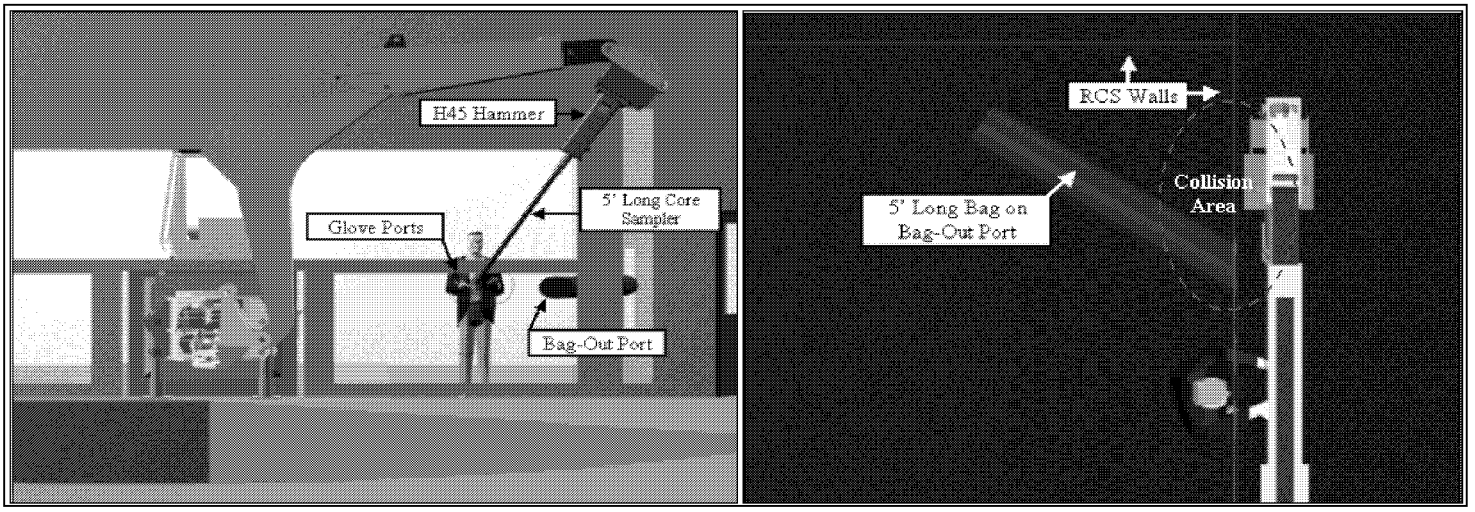


Figure 11. Physical Stop to Prevent Glove Port Penetration by Core Sampler

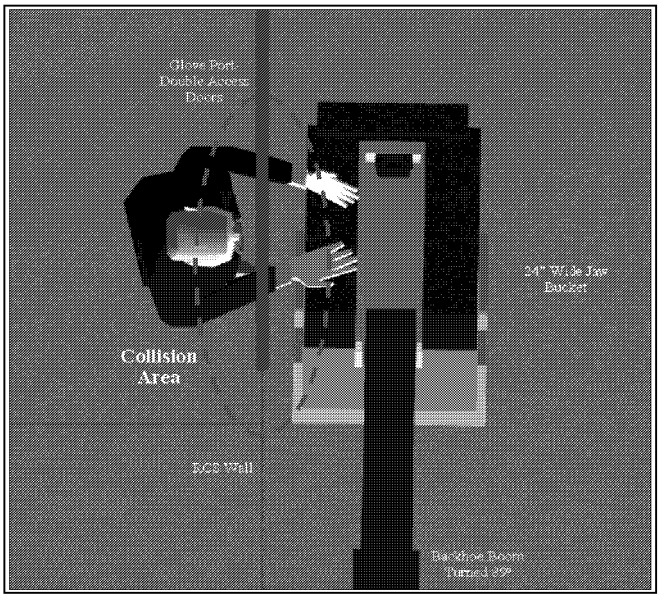


Figure 12. Top View of Glove Port and 24" Wide JAW Bucket Interface

The right and left boom swing stop plates (welded to the frame of the backhoe as shown on the bottom of Figure 13) have been drilled, tapped, and counter sunk for two flathead screws (supplied). These screws support swing stop shims (drawing 519933-24 through -30) of various thicknesses.

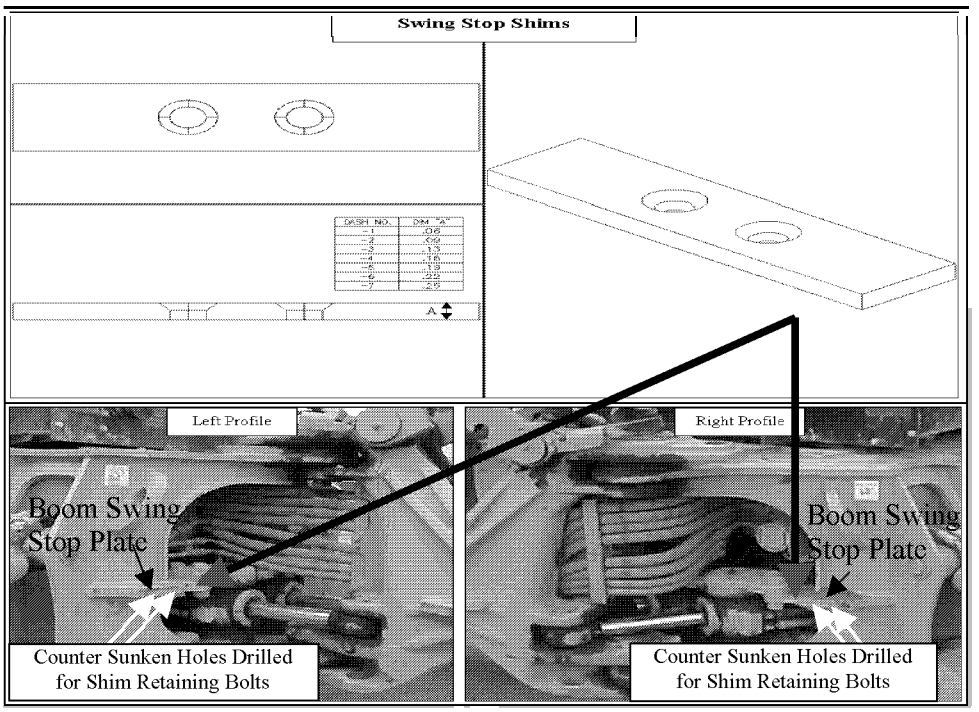


Figure 13. Swing Stop Shim Installation

Some of these shims have been pre-installed as per the pre-requisites. Once the backhoe is anchored to the FFS, the JAW bucket is fully curled to the stick and the boom-stick-JAW combination of the backhoe is swung 90o north (from center) to the glove ports. Swing stop shims are then removed until the hydraulic quick connects (mounted on the side of the JAW bucket coupler) are accessible from the glove ports.

Following the boom swing adjustment, on the glove port side of the backhoe, the boom is rotated 180o to the south RCS wall and the above process is repeated.

## 2.6 Attaching the Outer Boot to the RCS (Facilities Package Subcontractor)

### 2.6.1 Weld the Bottom Boot Channel onto the Backhoe Outer Boot Assembly

Position the bottom boot channel and channel caps (drawings 519933-16 and 519933-17) on the FFS under the outer backhoe boot assembly as shown on Figure 14. Remove bottom boot channel and weld caps to channel as shown on drawing 519933. Reinstall bottom boot channel assembly. Remove and support the Viton gasket form the bottom the sides of the outer boot to prevent burning during welding. Weld the bottom boot channel to the backhoe outer boot channel assembly.

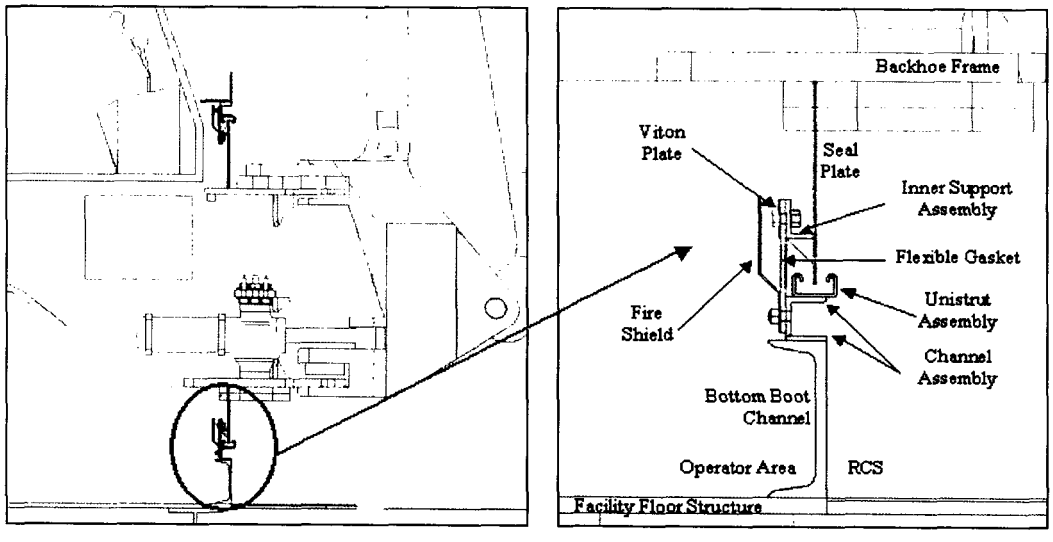


Figure 14. Bottom Boot Channel

### 2.6.2 Weld the Bottom Boot Channel to the FFS

Following attachment of the bottom boot channel to the backhoe boot channel assembly, the bottom boot channel is welded to the FFS as per drawing 519933. Reinstall Viton gasket after air-cooling of welding is complete.

### 2.6.3 Seal Weld Cap Seal Assembly on Both Stabilizer Support Frames

Center the four cap seal assemblies (drawing 519933-14) on the stabilizer mounting pins as shown in Figure 15. The caps are mounted on the RCS side of the stabilizer support frames and welded as per drawing 519933 to prevent contaminant migration through the mounting holes into the operator area. Weld caps on both the right and left stabilizer support frames as per drawing 519933.

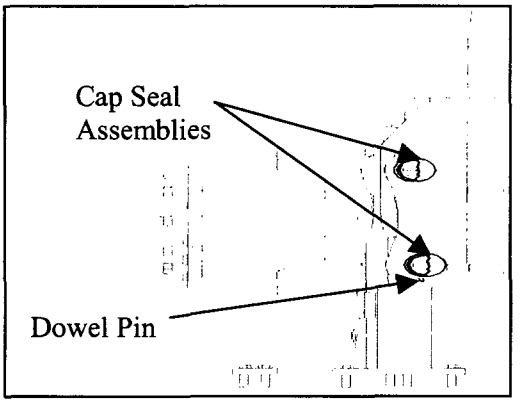


Figure 15. Cap Seal Assembly & Dow Pin

### 2.6.4 Seal Weld Retainer (Dowel) Pins into Lower Mounting Pins

Seal weld the lower mounting pin's retainer pin (dowel pin shown on Figure 15) to prevent contamination from migrating through the pinhole into the operator area. Seal weld as per drawing 519933.

### 2.6.5 Install the RCS Windows and Associated Hardware Around the Backhoe Outer Boot

Install the RCS windows and associated hardware over the backhoe penetration. Mate the RCS angle iron with the backhoe outer boot channel assembly along the top and sides of the backhoe boot assembly as shown in Figure 16.

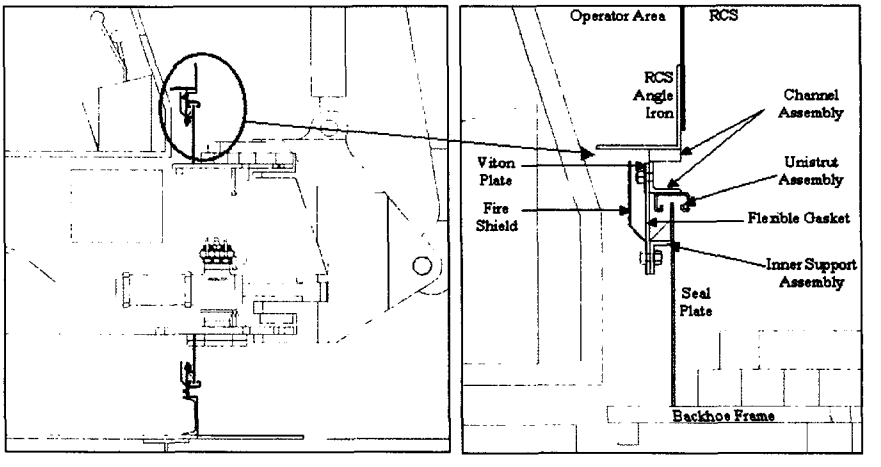


Figure 16. Top and Side Backhoe Outer Boot Assembly

### 2.6.6 Drill and Bolt RCS Angle Iron to Outer Boot Channel Assembly

Upon fitting the outer boot channel assembly to the RCS angle iron, match drill the RCS angle iron to the channel assembly every 6 inches along the top and sides. Bolt the RCS angle iron to the channel assembly along the top and sides of the backhoe boot assembly with 3/8-16 UNC-2A carbon steel hex head bolts ASMT A449 and 3/8-16 UNC-2B carbon steel hex head nuts ASMT A563 grade B as shown in Figure 17.

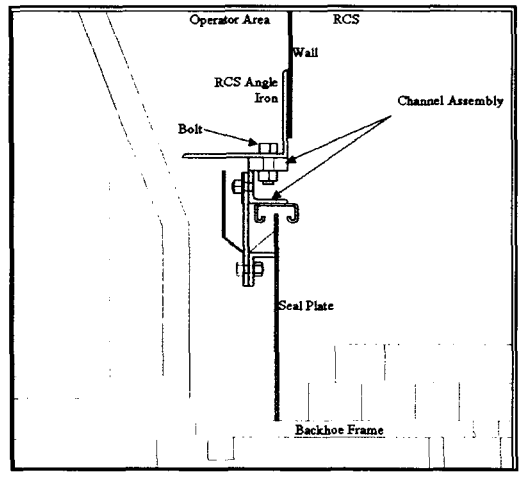


Figure 17. Bolt RCS Angle Iron to the Channel Assembly

## 2.7 Drip Pan and Exhaust (Facilities Package Subcontractor)

### 2.7.1 Install Drip Pans Under the Backhoe

Install the hydraulic oil catch basin assembly, fuel catch basin assembly, battery fluid catch basin assembly, and RCS catch basin assembly as per drawing 519933.

### 2.7.2 Place Exhaust System Hose Over Backhoe Exhaust Pipe

Attach the exhaust system hose over the backhoe exhaust pipe as per facility drawing HV drawings.

## 2.8 Hydraulic Disconnection of Brakes, Loader, & Steering (Facility Package Subcontractor Lower Tier)

The Pocatello office of Western States Equipment (WSE) shall perform work covered in this section. WSE shall be a lower tier to the Facility Package Subcontractor.

### 2.8.1 Disconnect and Plug Hydraulic Brake Pump Suction Line at Tank

If running, turn off the backhoe. Disconnect, drain, and plug hydraulic brake pump suction line near the hydraulic tank as per drawing 519933-Photo 1.

### 2.8.2 Disconnect and Plug Hydraulic Brake System High Pressure Feed Line

Disconnect, drain, and plug hydraulic brake system pressure line as per drawing 519933-Photo 2.

### 2.8.3 Remove the Brake Pump and Associated Suction Line

Remove the brake pump and associated suction line. Install cover plate on variable pump housing as per drawings 519933-Photo 1 and 2.

### 2.8.4 Disconnect and Plug Hydraulic Brake system Return & Spool Drain Lines

Disconnect, drain, and plug brake return line as per drawings 519933-Photo 3.
Disconnect, drain, and plug brake valve spool drain #1 as per drawing 519933-Photo 3.
Disconnect, drain, and plug brake valve spool drain #2 as per drawing 519933-Photo 9.

### 2.8.5 Disconnect and Plug Loader Valve Group High Pressure Feed Line

Disconnect, drain, and plug loader control valve pressure line as per drawing 519933-Photo 5.

### 2.8.6 Disconnect and Plug Loader Valve Group Return Line

Disconnect, drain, and plug loader control valve return line as per drawing 519933-Photo 5.

### 2.8.7 Reroute Resolver Network Line Around Loader Valve Group

At the loader valve group, disconnect the line from the main valve and cap the loader valve as per drawing 519933-Photo 5. At the loader valve group, disconnect the signal line to the pump and cap the loader valve as per drawing 519933-Photo 5. Connect the loader valve line to the pump signal line as per drawing 519933-Photo 5.

### 2.8.8 Disconnect and Plug Power Steering High Pressure Feed Lines

The power steering pressure feed line is disconnected and plugged when the loader priority valve pressure feed line is disconnected and plugged in step 2.8.5.

### 2.8.9 Disconnect and Cap Power Steering Return Lines

Disconnect, drain, and cap return line from power steering as per drawing 519933-Photo 7.

### 2.8.10 Start Backhoe, Leak Test, and Test Parameters

Following the disconnection and capping of the backhoe brakes, loader, and steering the backhoe will be started and allowed to idle. While the backhoe is idling, all disconnected and capped hydraulic lines will be checked for leakage. If leakage is found the backhoe is turned off and the leak is repaired. If no leakage is found the backhoe boom cylinder, stick cylinder, extendable stick cylinder, bucket curl cylinder, Jaw bucket auxiliary cylinder, boom swing cylinders, and the quick disconnect coupler are manipulated within their entire parameters to insure that all systems are operational and pump operational pressure is achieved. If any of the previously mentioned systems are compromised and/or operational pressure is not achieved, perform diagnostics and correct system function. If the system functions within acceptable parameters, idle the backhoe and check all disconnected and capped hydraulic lines for leakage. Upon satisfactory leak testing of hydraulic lines, the backhoe installation is complete.

# Backhoe Installation Sequencing

## Attaching the Rear Support & Front Axial Assemblies (Facilities Package Subcontractor)

2.1.1 Position Backhoe Within RCS Opening
2.1.2 Jack the Front of the Backhoe and Remove the Front Tires
2.1.3 Position the Front Axial Supports on FFS & Lower Backhoe
2.1.4 Jack Rear of the Backhoe & Attach Rear Support Assemblies onto Backhoe Stabilizer Support Frames
2.1.5 Remove the Rear Tires & Lower the Backhoe
2.1.6 Insure that the Front Axial Support Caps Fit Securely Around Front Axial
2.1.7 Install the RCS Windows and Associated Hardware Around the Backhoe Boot
2.1.8 Insure that the Backhoe Boot Aligns With the RCS Opening
2.1.9 Remove the RCS Windows and Associated Hardware Around the Backhoe Boot
2.1.10 Mark the Rear Support and Front Axial's Base Plate Hole Pattern on the FFS
2.1.11 Jack the Front of the Backhoe and Remove the Front Axial Supports
2.1.12 Install the front tire and Lower the Backhoe
2.1.13 Jack the Rear of the Backhoe and Remove the Rear Supports
2.1.14 Install the Rear Tire and Lower the Backhoe
2.1.15 Drive Backhoe Away from the RCS to Provide Clearance for Drill and Tap
2.1.16 Drill and Tap FFS to Match Templated Bolt Hole Patterns
2.1.17 Position Backhoe Within RCS Opening
2.1.18 Jack the Front of the Backhoe and Remove the Front Tires
2.1.19 Position the Front Axial Supports on FFS & Lower Backhoe
2.1.20 Jack Rear of the Backhoe & Attach Rear Support Assemblies onto Backhoe Stabilizer Support Frames
2.1.21 Remove the Rear Tires & Lower the Backhoe
2.1.22 Bolt The Rear Support and Front Axial's Base Plate Assemblies to the FFS
2.1.23 Bolt Front Axial Support Caps onto Front Axial Supports

## Attaching the Front Support Assemblies (Facilities Package Subcontractor)

2.3.5 Raise the Loader Arms Off the FFS
2.3.4 Mark the Front Support Assemblies Base Plate Hole Pattern on the FFS
2.3.3 Lower the Loader Arms Until the Front Support Assemblies Touch the FFS
2.3.2 Remove the Front Adjustment Assembly Locking Bolts
2.3.1 Attach the Front Support Assemblies onto The Front Loader Arm Pins
2.3.6 Drill and Tap FFS to Match Templated Bolt Hole Patterns
2.3.7 Lower Loader Arms With Front Support Assemblies onto the FFS
2.3.8 Bolt The Front Support Assemblies to the FFS

## Attaching the Brace Assemblies (Facilities Package Subcontractor)

2.2.7 Weld The Brace Assemblies to the Rear Support Assemblies
2.2.6 Bolt The Brace Assemblies to the FFS
2.2.5 Relocate Brace Assemblies on the Rear Support Assemblies
2.2.4 Drill and Tap FFS to Match Templated Bolt Hole Patterns
2.2.3 Remove the Brace Assemblies from the Rear Support Assemblies
2.2.2 Mark the Brace Assemblies Base Plate Hole Pattern on the FFS
2.2.1 Position Brace Assemblies on the Rear Support Assemblies

## Secure Front Adjustment Assemblies (Facilities Package Subcontractor)

2.4.1 Jack Up Loader Arms (while bolted) to Remove Residual Slack
2.4.2 Weld Front Adjustment Assemblies in Place
2.4.3 Remove Hydraulic Jacks from Front Loader Arms

## Swing Stop Shims (Facilities Package Subcontractor)

2.5.1 Adjust Physical Stop Shims, As Needed, For Right-Left Swing

## Attaching the Outer Boot to the RCS (Facilities Package Subcontractor)

2.6.1 Weld the Bottom Boot Channel onto the Backhoe Outer Boot Assembly
2.6.2 Weld the Bottom Boot Channel to the FFS
2.6.3 Seal Weld Cap Seal Assembly on Both Stabilizer Support Frames
2.6.4 Seal Weld Retainer Pins into Lower Mounting Pins
2.6.5 Install the RCS Windows and Associated Hardware Around the Backhoe Boot
2.6.6 Drill and Bolt RCS Angle Iron to Outer Boot Channel Assembly

## Drip Pan and Exhaust (Facilities Package Subcontractor)

2.7.1 Install Drip Pans Under the Backhoe
2.7.2 Place Exhaust System Hose Over Backhoe Exhaust Pipe

## Hydraulic Disconnection (Brakes, Loader & Steering) (Facility Package Subcontractor Lower Tier)

2.8.1 Disconnect and Plug Hydraulic Brake Pump Suction Line at Tank
2.8.2 Disconnect and Plug Hydraulic Brake System High Pressure Feed Line
2.8.3 Remove Brake Pump and Associated Suction Line
2.8.4 Disconnect and Plug Hydraulic Brake system Return & Drain Lines
2.8.5 Disconnect and Plug Loader Valve Group High Pressure Feed Line
2.8.6 Disconnect and Plug Loader Valve Group Return Line
2.8.7 Reroute Resolver Network Line Around Loader Valve Group
2.8.8 Disconnect and Plug Power Steering High Pressure Feed Lines
2.8.9 Disconnect and Cap Power Steering Return Lines
2.8.10 Start Backhoe, Leak Test, and Test Parameters

Figure 18. Backhoe Installation Flow Diagram

# REFERENCES

Caterpillar, 2000, *446B Backhoe Loader*, AEHQ 3817-04

INEEL OU 7-10 Glovebox Excavator Method Project Excavator Modifications, Excavator Installation, DWG-519933, 5-31-02

INEEL OU 7-10 Glovebox Excavator Method Project Facility Drawings, DWG-HV9

# Appendix D

# PLN-1088

# Packaging Glovebox System Drum Loadout Enclosure Assembly and Installation

Document ID:PLN-1088
Revision ID:0
Effective Date:7/19/2002

# PLAN

# Packaging Glovebox System Drum Loadout Enclosure Assembly and Installation Plan for the OU 7-10 Glovebox Excavator Method Project

Prepared for:
U.S. Department of Energy
Idaho Operations Office
Idaho Falls, Idaho


Idaho National Engineering
and Environmental Laboratory

Form 412.14
07/24/2001
Rev. 03

412.15
03/14/2002
Rev. 03

# DOCUMENT MANAGEMENT CONTROL SYSTEM (DMCS)
# DOCUMENT APPROVAL SHEET

1. Document Identifier: PLN-1088 2. Project File No. (optional): 021052 3. Revision No.: 0

4. Document Title: Packaging Glovebox System Drum Loadout Enclosure Assembly and Installation Plan for the OU 7-10 Glovebox Excavator Method Project

5. Author: D. E. Keller 5. Owner: S. A. Davies

7. Comments:

REVIEW AND APPROVAL SIGNATURES
Denote R for review concurrence, A for approval, as appropriate.

| 8. Type or Printed Name / Signature | 9. R/A | 9. Date | 10. Organization/ Discipline |
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| D. E. Keller<br>D E Keller | R | 7/17/02 | PGS Design<br>Author |
| R. J. Carpenedo<br>R Carpenedo | R | 7/18/02 | PGS Design |
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| S. A. Davies<br>K. L. Skropshire for SAD | A | 7/22/02 | Project Engineer |
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| 11. Document Control Release Signature: | | | |

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Item or activity to which the QA Records apply:

18. NRC Related? Yes ☐ No ☒ 19. Periodic Review Frequency: N/A ☒, 5 years ☐, or Other

| | | |
|---|---|---|
| Plan<br><br>Environmental Restoration | **PACKAGING GLOVEBOX SYSTEM DRUM LOADOUT ENCLOSURE ASSEMBLY AND INSTALLATION PLAN FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT** | Identifier: PLN-1088<br>Revision: 0<br>Page: 1 of 4 |
| Document Control Center: (208) 526-0362 | Document Owner: Pit 9 | Effective Date: 7/19/02 |
| | **USE TYPE 3** | Change Number: |

# CONTENTS

# 1. SCOPE

A radioactive contamination confinement shall be installed underneath each of the three Packaging Glovebox Systems (PGS). The confinement shall be designated as the PGS Drum Loadout Enclosure and shall be referred to as "the enclosure" in this document. The enclosure will be designed and fabricated by BBWI. The completed enclosure will be provided to the Subcontractor as GFE. The enclosure is designed to comply with the existing INEEL radiological engineering requirements for large area containments. These requirements are documented in INEEL Management Control Procedure 198 (MCP-198). This procedure is attached.

## 1.1 Work Included

The Subcontractor shall assemble and install the Drum Loadout Enclosures.

## 1.2 Work Not Included

The fabrication of the enclosures is not included.

# 2. PERFORMANCE

## 2.1 Assembly and Installation

The Subcontractor shall assemble and install the enclosure as shown on drawings 522003 and 522009. The Subcontractor shall refer to MCP-198, sections 4.7 and 4.8 for additional guidance.

To help the Subcontractor better understand the enclosure design, the enclosure design drawings used to fabricate the enclosure are attached.

## 2.2 Inspection and Testing

After installation a configuration inspection will be performed by the Contractor's radiological control technician to verify that the enclosure has been assembled and installed as indicated on drawings 522003 and 522009. The inspection will be performed according to MCP-198 sections 4.9 and Appendix B (inspections). The inspection will verify that the enclosure has been installed without damage and is ready to release to the Contractor for radiological engineering certification for use.

# 3. ATTACHMENTS

The following drawings and documents have been attached to this plan.

Documents

INEEL MCP-198 – Large Area Containments

Drawings

Dwg 522003
Dwg 522009
Dwg 522010 (Reference Only)
Dwg 522011 (Reference Only)

# Attachments

| Management Control Procedure Companywide | LARGE AREA CONTAINMENTS | Identifier: MCP-198<br>Revision: 3<br>Page: 1 of 5 |
|---|---|---|
| Document Control Center: (208) 526-1202 | Document Owner: Director Radiological Control | Effective Date: 07/06/00 |
| Manual: 15B Radiation Protection Procedures | USE TYPE 3 | Change Number: 45783 |

# 1. PURPOSE

To provide guidelines for large area containment requirements, design, inspection, construction, and use of containments covering large areas to control the spread of radioactive contamination. Large area containments are used for work performance on radiologically contaminated or potentially contaminated systems, surfaces, equipment, materials, or for work that could potentially cause a spread of contamination

# 2. SCOPE AND APPLICABILITY

This procedure covers and applies to large area containment analysis, planning, design, construction, erection, inspection, use, decontamination, removal, and waste disposal. This activity is considered an operations related task (ORT) for which the activity hazards are adequately mitigated by training or qualification of the individual performing the activity.

# 3. PREREQUISITES

3.1 The job requester or job supervisor responsible for the work activity has provided a detailed description of the work conditions and expected results for the planner's use in development of the work control documents.

3.2 Personnel assigned to perform work related to this procedure are qualified in their respective discipline (i.e. Job Planner, Containment Constructor, RCT, etc.)

# 4. INSTRUCTIONS

4.1 Job Planner: Analyze requested work for the possible use of large area containments.

4.1.1 Specify the use of large area containments when the following conditions exist:

A. other containments, such as glove bags, cannot be used due to space requirement, configuration limitations, or complex job scope

B. work would likely release contamination to the surrounding work area, which is not a contamination area (as defined in Table 2-4 of the INEEL Radiological Control Manual [RCM])

C. work in an area or on equipment that involves chipping, burning, grinding, welding, or other operations that would likely create or increase airborne contamination levels

D. work is within a contamination area that would likely release contamination that would substantially increase contamination levels in the area (such as, >100 times the original contamination level of the area).

4.1.2 Evaluate use of large area containments in areas, such as cells, where high levels of contamination or radiation exist against added radiation exposure involved during installation and removal of containments, and give consideration to the ease of decontamination due to cell design.

**NOTE:** *Appendix A contains large area containment design considerations.*

4.2 Job Planner: Design large area containments as necessary, with applicable assistance from the requester, Radiological Support, and Engineering.

4.2.1 When work areas are below 20°F (-6.7°C), include an additional containment stage, heated for use as a dressing and change area.

4.2.1.1 Provide heaters in this area or a heat chamber from which heated air may be drawn into the containment.

4.3 Job Planner: Submit the large area containment design to Radiological Support along with the intended containment use, including dimensions and accessories for review and approval.

4.4 Radiological Support: Review large area containment design and intended use for adequate radiological control and safety.

4.4.1 If the containment design and intended use are approved, return the design to the job planner for inclusion in the job planning package.

4.4.2 If the containment design and intended use are not approved, notify the job planner and requester of needed changes in the design or intended use.

4.5 Job Planner: Issue the containment design with the work order for fabrication and/or installation.

**NOTE:** *Appendix B contains accepted methods of large area containment selection, fabrication, and use.*

4.6 Job Supervisor: Supervise the construction and installation of large area containments in accordance with Appendix B, Accepted Methods of Large Area Containment Selection, Fabrication, Installation, Use, and Removal.

4.6.1 Evaluate the need for proper anchoring of the containment to withstand area wind conditions if the tent is erected for use outside of a permanent building.

4.7 Containment Constructor/Installer: Construct and install approved containments in accordance with Appendix B, Accepted Methods of Large Area Containment Selection, Fabrication, Installation, Use, and Removal, work order instructions, and radiological control technician (RCT) directions.

4.8 Containment Constructor/Installer Attach signs or stickers identifying status of containments containing yellow materials that are under construction or being used for nonradiological purposes.

4.9 Radiological Control Technician (RCT): Inspect large area containments prior to use, daily while in use, and at least monthly if not in use to determine need for repairs, replacement, or decontamination and removal.

4.9.1 Use Form 441.37, page 2 of 2, Radiological Control Total Containment Tent Certification, and report any deficiencies to the RadCon foreman and job supervisor.

4.9.2 If a large area containment meets the requirements of Form 441.37, page 2 of 2 and is approved for use, for the initial inspection, submit the completed form to be stored in the Radiological Record System.

4.9.3 Attach a Containment Approved tag, Form 441.38, to the containment. Date and sign the tag.

4.9.4 Date and sign the Containment Approved tag for each additional inspection, if the containment meets the requirements of Form 441.37, page 2 of 2.

4.9.5 Notify the job supervisor that the inspection is complete.

4.9.6 If a large area containment does not meet the requirements and is not approved for use, attach a "Disapproved For Use" sticker and submit a completed copy of Form 441.37, page 2 of 2, to the RadCon foreman, indicating reason(s) for disapproval.

4.9.7 Contact the job supervisor with the inspection results so appropriate actions can be initiated to resolve problems causing the containment to fail inspection.

4.10 Job Supervisor: Supervise repair or replacement of a large area containment not approved for use.

4.11 Containment Constructor/Installer: Repair or replace a large area containment not approved for use as directed by the job supervisor and RCT.

4.12 RCT: Inspect a large area containment following repairs or replacement and as requested by the job supervisor.

4.12.1 Follow steps 4.9.1-4.9.7 for reinspection of repaired or replaced large area containments.

4.13 Job Supervisor: Supervise work in large area containments. Generate a radiation work permit (RWP) for performance of planned work with assistance from RadCon personnel.

4.14 Radiological Worker: Perform assigned work in large area containment as outlined on the work control procedure, RWP, and as directed by the job supervisor.

4.14.1 Confirm the Containment Approved tag has been dated and signed for the current day **prior to entry**.

4.14.2 If containments are damaged during work, stop work and notify the RCT immediately.

4.14.3 Resume work when the damage has been repaired and approved by the RCT.

4.15 Job Supervisor: Supervise large area containment decontamination and removal.

4.16 Radiological Worker: Decontaminate the large area containment as directed by the job supervisor and the RCT.

4.17 Containment Remover: Remove large area containments within 14 days of job completion (as determined by job supervisor) in accordance with applicable requirements.

4.18 Job Supervisor: Supervise waste disposal in accordance with applicable requirements.

## 5. RECORDS

| Records Description | Uniform File Code | Disposition Authority | Retention Period |
|---|---|---|---|
| Records delineated in separate procedures. | | | |
| Form 441.37, page 2 of 2, Radiological Control Total Containment Tent Certification. | 5308 | A1-21.3-b-2 | When purpose is served or after 1 year, which ever is earlier (EPI)* |

* EPI records retained indefinitely until further notice

## 6. DEFINITIONS

None

## 7. REFERENCES

INEEL Radiological Control Manual, Sections117, 312, 316, 337, 342, 343, 347, 453 and 463.

## 8. APPENDICES

Appendix A, Large Area Containment Design Considerations.

Appendix B, Accepted Methods of Large Area Containment Selection, Fabrication, Installation, Inspection, Use, and Removal.

## APPENDIX A
## Large Area Containment Design Considerations

Consideration should be given to the following parameters when specifying the design of a large area containment.

**Work area size and location**

- Access to the component to be worked
- The containments effect on egress routes
- The containments effect on other operations in the area
- The location of supports for equipment and the containment
- Criticality safety, fire safety, and industrial safety requirements for the containment
- The method of containment support

**Type of operation to be performed and the expected contamination levels**

- The need for complete versus partial enclosure
- The need for multiple rooms, change areas, and buffer areas
- Provisions for drainage
- Access for services (such as service air electrical services or ventilation)
- Provisions to prevent burning or melting

**Type and size of equipment used in the containment**

- Number and location of zippered openings
- Location of crane access or lifting points (if required)

**Containment accessories and equipment**

- Number and location of service sleeves for plant air, electrical leads, airlines, welding leads, ventilation trunks, and other penetrations in the containment

## APPENDIX A

- The ventilation system, including inlet openings-filters and HEPA filtered exhaust
  - Should be designed with 6 to 12 air changes per hour
  - A slight negative pressure is generally maintained in the containment.

## APPENDIX B
## Accepted Methods of Large Area Containment Selection, Fabrication, Installation, Inspection, Use and Removal

Selection of Large Area Containment Fabrication Materials

- Walls, floors, and ceiling material must be fire retardant, meeting a flame spread of 25 or less in accordance with NFPA 701.
- General use material is nylon reinforced PVC sheeting (18 oz. standard) or approved equal.
- Material for windows, providing light and visibility of work operations is generally 20 oz. clear PVC or approved equal.
- Materials for service sleeves may be the same material used for containment fabrication or metal/plastic sleeves (see Figure 1).

Large Area Containment Fabrication (see Figure 2)

- Sew, glue, or electronically seal all seams.
- Provide personnel access door(s) with zipper closure, clear viewing panel, and radiological posting sign pouches. Zippers should operate from bottom to top.
- Provide sleeves or attachment capabilities for HEPA filtered exhaust ventilation equipment.
- Provide inlet air filter(s) in the containment to allow air flow into the tent and to maintain a slight negative pressure. Use a filter media (such as reticulated foam) to maintain containment cleanliness and extend ventilation HEPA filter life.
- Provide equipment access door(s), if required, with zipper closure in top or side for access. Ensure zipper opens in a direction that minimizes tent opening when moving equipment.
- Provide observation windows to permit ease of communication between RCT, work supervisor, and workers in the containment.
- When crane access is needed into the containment, the roof may have zipper, Velcro, or sleeved opening to permit access.

## APPENDIX B

Installation

- Provide or use adequate support structures for containment suspension (see Figure 3).
- Secure the containment to the support structures (accepted devices; rope, elastic rope, electrical ties, surgical tubing, and wire).
- Sharp edges and objects, rough edges, and wooden surfaces should be padded or taped to protect workers from punctures, scrapes, or splinters.
- All penetrations (such as ventilation ducts, airlines, or electrical cords) should gain access through sleeve(s) in the containment wall. Securely tape the sleeve to the penetrating objects. Any sleeves not used should also be taped closed.
- Airlocks are used for personnel entry and exit. These areas should be maintained as clean or low level contamination areas for protective clothing removal.
- Filter pockets with unidirectional flow prevention devices (or flaps) should be attached to the containment, usually on or near the door, to provide inlet make-up air for the ventilation system.
- A standard size furnace filter is generally used.
    - The unidirectional flow prevention device is generally placed on the inside of the containment so that if pressurization occurs, the flap will prevent airflow to the outside.
    - The unidirectional flow flaps should completely cover the furnace filter penetration.
- Airline check boxes and airline hose hangers, if used, are attached to the containment and used for hanging and separating airlines inside the containment (see Figure 4). The airline check box is mounted to allow the RCT to check the airline connection for contamination from outside the containment.

**NOTE:** *Numbers may be placed on the service sleeves, airline hose hangers, and airline check box to aid in identifying contaminated airlines for replacement or reuse.*

## APPENDIX B

Ventilation

- Airflow is established from the outside to the inside of the containment (that is, areas of low contamination to areas of high contamination) during work in the containment.
- In cases where containments are installed over cell accesses and use plant ventilation to maintain negative pressure, DOP-tested HEPA filters should be attached to the tent, allowing air within the containment to be filtered should the cell or containment pressurize.
- For containments where plant HEPA ventilation is not available, a DOP-tested portable ventilation system should be attached. The installation should establish airflow across the contaminated area drawing contaminated air away from the workers.

Inspection

**NOTE:** *Inspection should be performed informally by containment installation personnel following installation and formally by the RCT upon notification of containment completion. Use FORM 441.37 Radiological Control Total Containment Tent certification for completion of these inspections.*

Check the following large area containment items:

- There is adequate support to support the containment weight and prevent collapse under internal negative pressure.
- All seams are sealed. Check for holes or tears that may have occurred during installation.
- Zipper and other entrances are working properly.
- Sharp objects are properly covered.
- Adequate lighting is provided.
- The HEPA exhaust is installed opposite the inlet filters and does not place the workers breathing zone between the exhaust trunk and the source of contamination.

## APPENDIX B

- A portable air sampler or continuous air monitor is in close proximity. Provisions have been made to return the air sampler discharge to the containment (if possible).

Use

- Check to ensure the containment is properly supported, all services are attached, and all service penetrations are sealed.
- Check ventilation to ensure it provides the needed flow.
- Ensure adequate lighting is provided in the internal and external areas.
- Ensure all tools and equipment are in or near the containment prior to start of job.
- Wear protective clothing in accordance with RWP requirements.
- Position work item between worker(s) and ventilation suction. If items are heavy and could cut through the tent floor, consider placing padding under the item.

Removal

- If scheduled for reuse, decontaminate the large area containment as directed by the RCT.
- If the containment is to be disposed of, decontaminate as necessary (as determined by Radiological Support or RCT), prior to disposal.
- Cut or remove support tie-offs, and collapse the containment while evacuating the containment atmosphere using the attached HEPA-filtered ventilation (if available).
- Dispose of the containment as radioactive waste.

## APPENDIX B

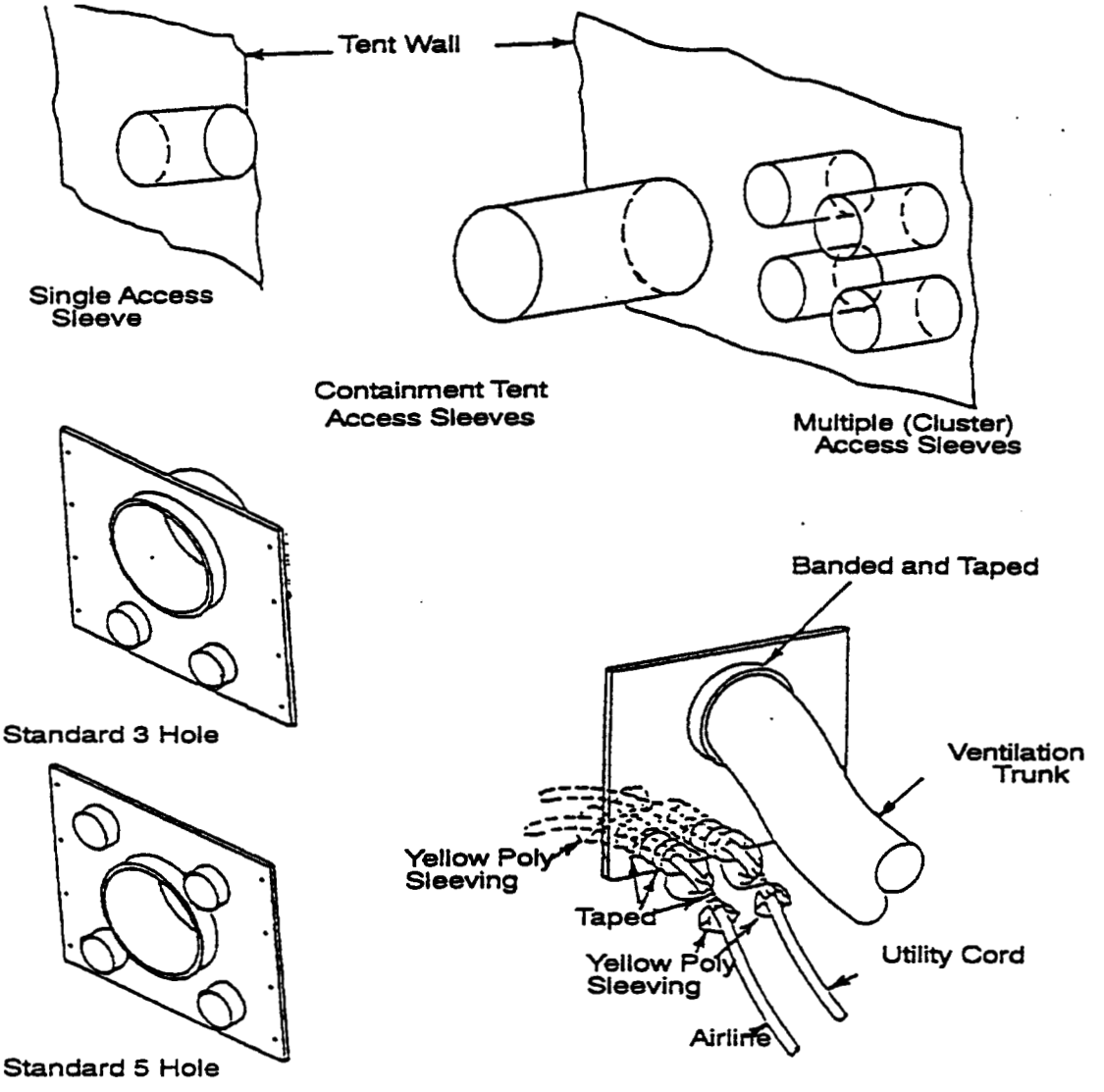


**Figure 1.** Containment access ports.

## APPENDIX B

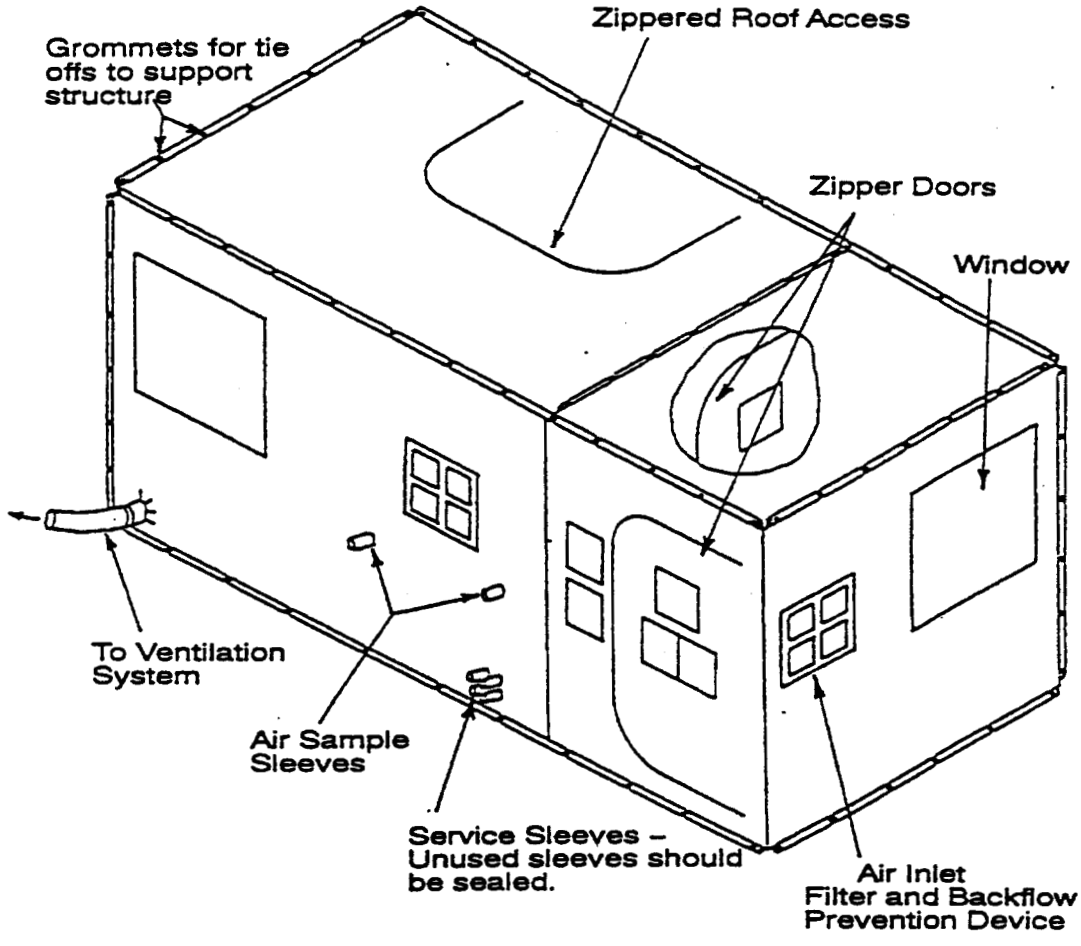


**Figure 2.** Containment tent.

## APPENDIX B

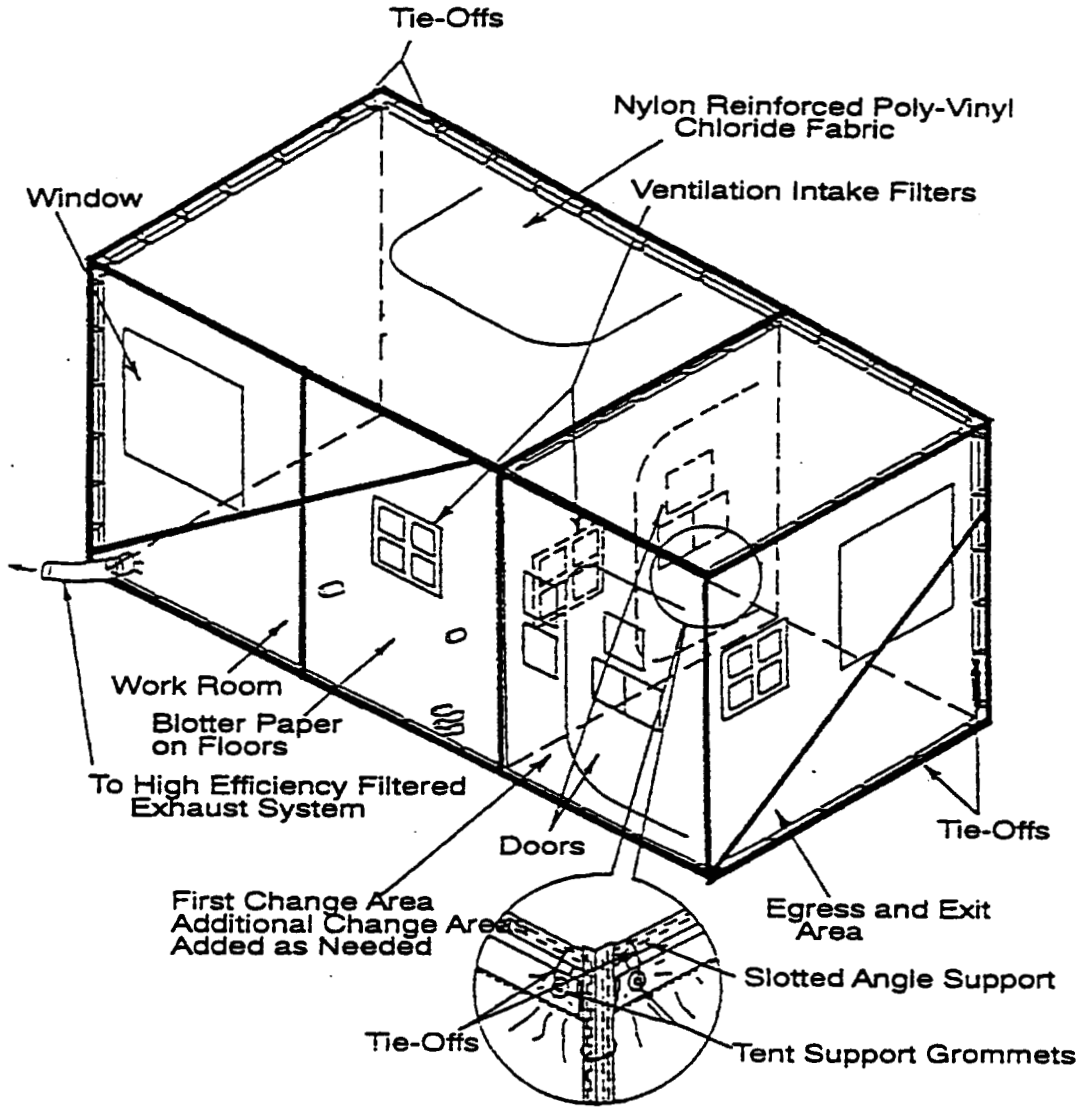


**Figure 3**. Containment tent and framework.

## APPENDIX B

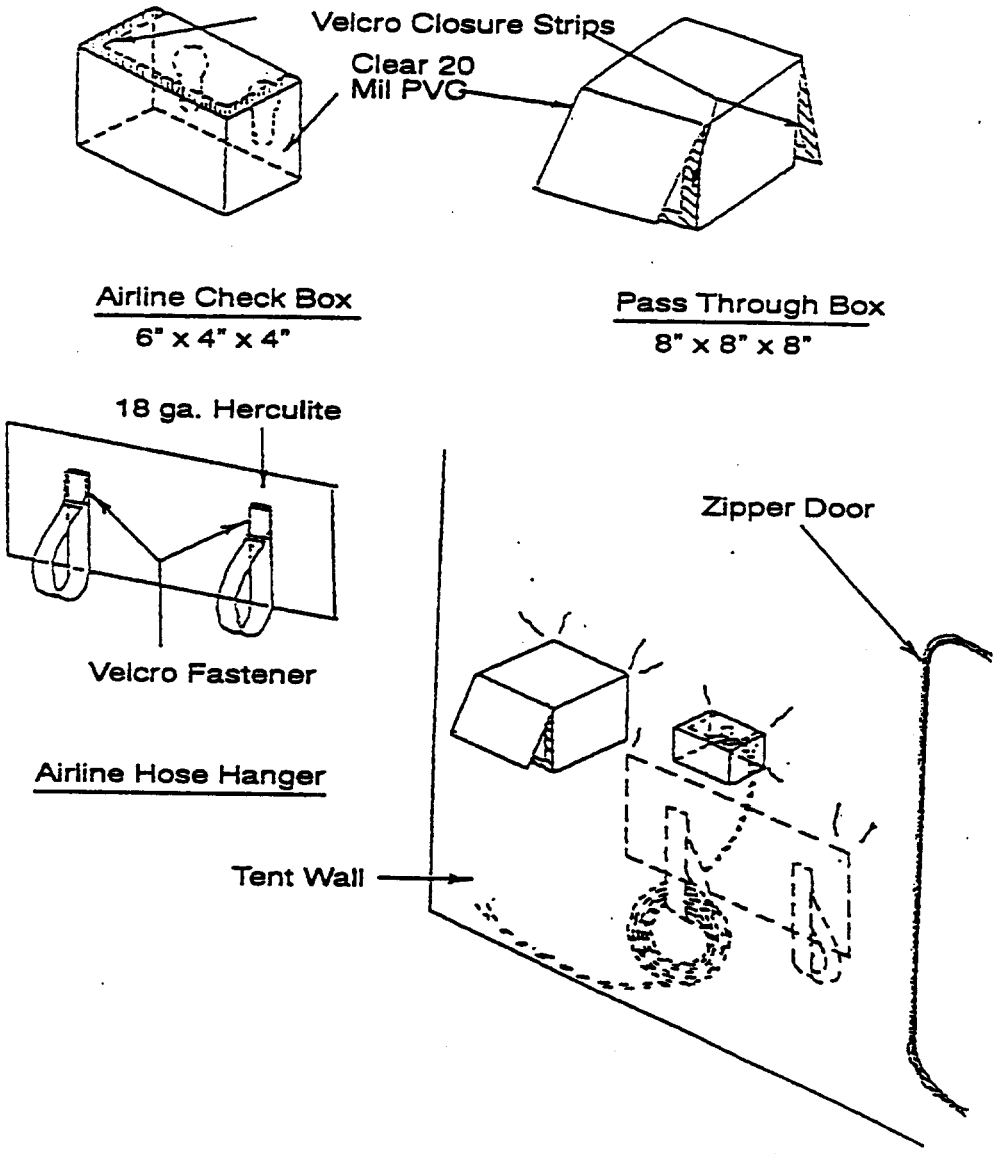


**Figure 4.** Containment tent accessories.

# Appendix E

## WES Penetration Details and Final Equipment Support Attachments to Structure and Miscellaneous

WES PENETRATION DETAILS, FINAL EQUIPMENT SUPPORT ATTACHMENTS TO STRUCTURE AND MISCELLANEOUS – APPENDIX E:

Details will be provided via separate document upon receipt of submittal of final assembly and shop drawings by the WES enclosure fabricator. Details will include:

- Penetration reinforcement and/or sleeving
- Attachments of utility supports and equipment to structural members.
- Final closure of construction opening in WES fabric structure.

# Appendix F

# RCS Catwalk

RCS CATWALK, PENETRATIONS AND EQUIPMENT SUPPORT ATTACHMENTS TO STRUCTURE APPENDIX F:

Details will be provided via separate document upon receipt of submittal of final assembly and shop drawings by the RCS enclosure fabricator. Details will include:

- Catwalk
- Penetration reinforcement and/or sleeving
- Attachments of utility supports and equipment to structural members.